2018 EMI POWERFACTORY CASE

Transpower New Zealand Limited

December 2018

Keeping the energy flowing




TRANSPOWER

Transpower New Zealand Limited The National Grid

1 Overview

The System Operator releases as per obligations of the Code, the latest PowerFactory case files for the Electricity Market Information (EMI) website for December 2018.

This year's update has seen a few updates affecting both steady state load flow and dynamic load flow simulations.

It is advised to run the case file in PowerFactory 2018 SP2 as the file was tested for both steady state and dynamically in this version of PowerFactory and found to be stable.

Steady State simulations: All voltages are above 0.95 p.u and less than 1.05p.u for 66kV and above.

Dynamic simulations: The case file was tested for RMS with 3 phase fault conditions on the 220kV busbar cleared in 120ms. The faults were thrown separately and found to be stable. Further to that generator and load trip event were done separately and the GOV of the machines responded accordingly.

2 Major Updates in 2018 version

2.1 North Island (NIPS):

2.1.1 Affecting Steady state/Short circuit calculations:

1. Corrected Pakuranga-Penrose 3 (PAK-PEN 3) line impedances
2. Corrected Brownhill-Pakuranga -1 and 2 (BHL-PAK) ratings
3. Bunnythorpe (BPE) T3 in service and T1 taken out of service.
4. Penrose (PEN) T8 and T9 NER are added within the transformer
5. Albany (ALB) ET8 and ET6 are fixed.
6. Glenbrook (GLN) loads are corrected. It was previously represented as one load, not differentiating between dirty bus and clean. Now the correct loads are modelled on the dirty and clean buses.
7. Nga Awa Purua (NAP) connection configuration is corrected to a connection rather than a tee.
8. BPE33 bus detailed substation diagram remodelled.
9. Kawerau (KAG), Matahina (MAT), Mokai (MOK) 2 winding transformer data updated (impedance, Iron losses and Power rating)
10. Huirangi (HUI) supply transformer T5 and T6 enabled auto tap changers.
11. Corrected Otahuhu (OTA) T3 zero sequence impedance

12. The following Earthing transformers (ET) were added- Stratford (SFD) ET 10, Henderson (HEN) ET5, Albany (ALB) ET4
13. OTA C30 and C31 are grounded Y, fixed
14. ONG cap is not a grounded Y, fixed
15. Added a MDN110 Station controller with no equipment in it for UNIRPC
16. Added Te Uku (TUK) to Te Kowhai (TWH) on the 33kV bus.
17. Changed HVDC representation to static generators.

2.1.2 Dynamic simulations:

Please see below the models that have been incorporated into the NIPS case file:

Contact Energy							
Generators		**Exicter**	**Frame**	**Governor**	**Limiters**	**PSS**	**Turbine**
OKI		Yes	with droop	Yes	No	No	No
PPI		Yes	with droop	Yes	OEL/UEL	Yes	No
SFD		Yes	with droop	Yes	OEL/UEL	Yes	Yes
SPL		Yes	without droop	Yes	No	Yes	Yes
TAA		Yes	with droop	No	OEL/UEL	No	No
THI		Yes	without droop	Yes	OEL/UEL/VHz	Yes	No
TRC		Yes	without droop	Yes	No	No	No
WHI		Yes	with droop	Yes	OEL/UEL	No	No
WRK		Yes	with droop	Yes	No	No	No
Genesis							
Generators		**Exicter**	**Frame**	**Governor**	**Limiters**	**PSS**	**Turbine**
HLY		Yes	with droop	Yes	OEL/UEL	No	Yes
KTW		Yes	with droop	Yes	OEL/UEL/VHz	Yes	No
PRI		Yes	without droop	Yes	PQ	Yes	No
RPO		Yes	with droop	Yes	OEL/UEL	No	No
TKU		Yes	with droop	Yes	OEL/UEL	No	No

TUI		Yes	with droop	Yes	OEL/UEL	Yes	No

KingCountryEnergy

Generators		Exicter	Frame	Governor	Limiters	PSS	Turbine
MHO		Yes	with droop	Yes	OEL/UEL	No	No

Mercury

Generators		Exicter	Frame	Governor	Limiters	PSS	Turbine
ARI		No	without droop	Yes	No	No	No
ATI		Yes	without droop	Yes	No	No	Yes
KPO		No	without droop	Yes	No	No	No
MTI_II		Yes	without droop	Yes	No	No	Yes
NTM		Yes	with droop	No	OEL/UEL	No	No
WKM		No	with droop	Yes	No	No	No

Trustpower

Generators		Exicter	Frame	Governor	Limiters	PSS	Turbine
MAT		Yes	with droop	Yes	OEL/UEL	No	No

2.2 South Island (SIPS):

2.2.1 Affecting Steady state/Short circuit calculations:

1. Updated the following stations with earthing transformer (ET) and impedance data
    - Albury (ABY) T2, South Dunedin (SDN) T1, Timaru (TIM) ET5, Stoke T6&T10
2. Waitaki (WTK) G3 earthing resistance is corrected to match other units
3. Changed HVDC representation to static generators.
4. Modelled new substation Gore -GOR 220/110 kV interconnection
5. Modelled new North-Makarewa-Gore-Three-Mile-Hill Circuit 1&2 220kV
6. Modelled new Timaru 220/110 kV interconnecting transformer (T5)

7. Updated Timaru 110 kV bus configuration
8. Updated Bromley (BRY) 220/66 kV transformer models (delete BRY T6, correct T5 earthing, added BRY-ET7, and relocate C6A to C7A position)
9. Updated Halfway Bush 220/110 kV transformer models (delete HWB T4)

2.2.2 Dynamic simulations:

Please see below the models that have been incorporated into the SIPS case file:

Contact Energy							
Generators		**Exicter**	**Frame**	**Governor**	**Limiters**	**PSS**	**Turbine**
CYD		Yes	without droop	Yes	OEL/UEL	No	No
ROX		Yes	without droop	No	OEL/UEL	No	No
Genesis							
Generators		**Exicter**	**Frame**	**Governor**	**Limiters**	**PSS**	**Turbine**
TKA		Yes	without droop	Yes	If/PQ	Yes	No
TKB		Yes	without droop	Yes	If/PQ	Yes	No
Meridian							
Generators		**Exicter**	**Frame**	**Governor**	**Limiters**	**PSS**	**Turbine**
BEN		Yes	without droop	Yes/TWD	No	Yes	Yes
MAN		Yes	without droop	Yes	No	Yes	Yes
OHB		Yes	With droop	Yes/TWD	OEL/UEL	No	Yes
OHC		Yes	With droop	Yes/TWD	OEL/UEL	No	Yes
WTK		Yes	with droop	Yes	OEL/UEL	No	Yes