2021 EMI POWERFACTORY CASE

Transpower New Zealand Limited

May 2021

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 May 2021.

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 2019 SP4 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 2021 version

2.1 North Island (NIPS):

2.1.1 Affecting Steady state/Short circuit calculations:

1. New transformers modelled: OTA T4, WHU T1, WHU T3, WKO T1
2. OTA T2, EDG T4, PEN C14 deleted – decommissioned
3. WHU T2 deactivated – to be decommissioned after new T3 commissioning
4. New capacitors modelled: HAM C1 HAM C2, OHW C1 and OHW C2
5. Linton 220 kV switchgear upgrade
6. Waverly 110 kV switchgear upgrade
7. MER load deleted – supply relinquished
8. Zero sequence impedance of star-tertiary winding transformers (PEN-T6, PEN-T10, HOB-T12, HAY T11, HAY T12) fixed
9. Bus configurations/naming at WRD, OTA, MTI, MTR, KAW, HAM, TUI, HAY, WIL, OHW, BPE, and KIN are updated
10. Connection i and j terminals of lines around SFD region are corrected
11. HAY 220 kV filter banks remodelled
12. Corrected rating of Tararua 3 (windfarm)

13. Added generator transformers to Tararua 3 and Te Apiti windfarms

14. KIN-T5 NER added

15. Four load scenarios have been added to the new case;
    - Light summer,
    - Light winter,
    - Peak summer,
    - Peak winter

2.1.2 Dynamic simulations:

1. All dynamic composite models are placed in a separate folder under the Network Model\Network Data\NIPS\Dynamic Models.

2. All the initialisation warnings and events have been eliminated, and the case performance has been much improved than the previous case.

3. The current case is suitable for small signal stability studies.

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

Contact Energy							
Generators		**Exciter**	**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		**Exciter**	**Frame**	**Governor**	**Limiters**	**PSS**	**Turbine**
HLY		Yes	with droop	Yes	OEL/UEL	Yes	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		Exciter	Frame	Governor	Limiters	PSS	Turbine
MHO		Yes	with droop	Yes	OEL/UEL	No	No

Mercury

Generators		Exciter	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		Exciter	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. Stoke C7A-D and R7A-B deleted – decommissioned
2. HWB 110 kV load deleted – converted to 33 kV
3. ASB 33 kV load deleted – converted to 66 kV
4. New transformers modelled: NSY T1 and NSY T2
5. Protection Relay script updated
6. Bus configurations/naming at KBY and TIM are updated
7. NER added to HWB-T5

8. BEN filter banks remodelled

9. Bus configurations/naming at GNY, TKA, MCH and OTI are updated

10. Four load scenarios have been added to the new case;
    - Light summer,
    - Light winter,
    - Peak summer,
    - Peak winter

2.2.2 Dynamic simulations:

1. All dynamic composite models are placed in a separate folder under the Network Model\Network Data\NIPS\Dynamic Models.

2. All the initialisation warnings and events have been eliminated, and the case performance has been much improved than the previous case.

3. The current case is suitable for small signal stability studies

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

Contact Energy

Generators		Exciter	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		Exciter	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		Exciter	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