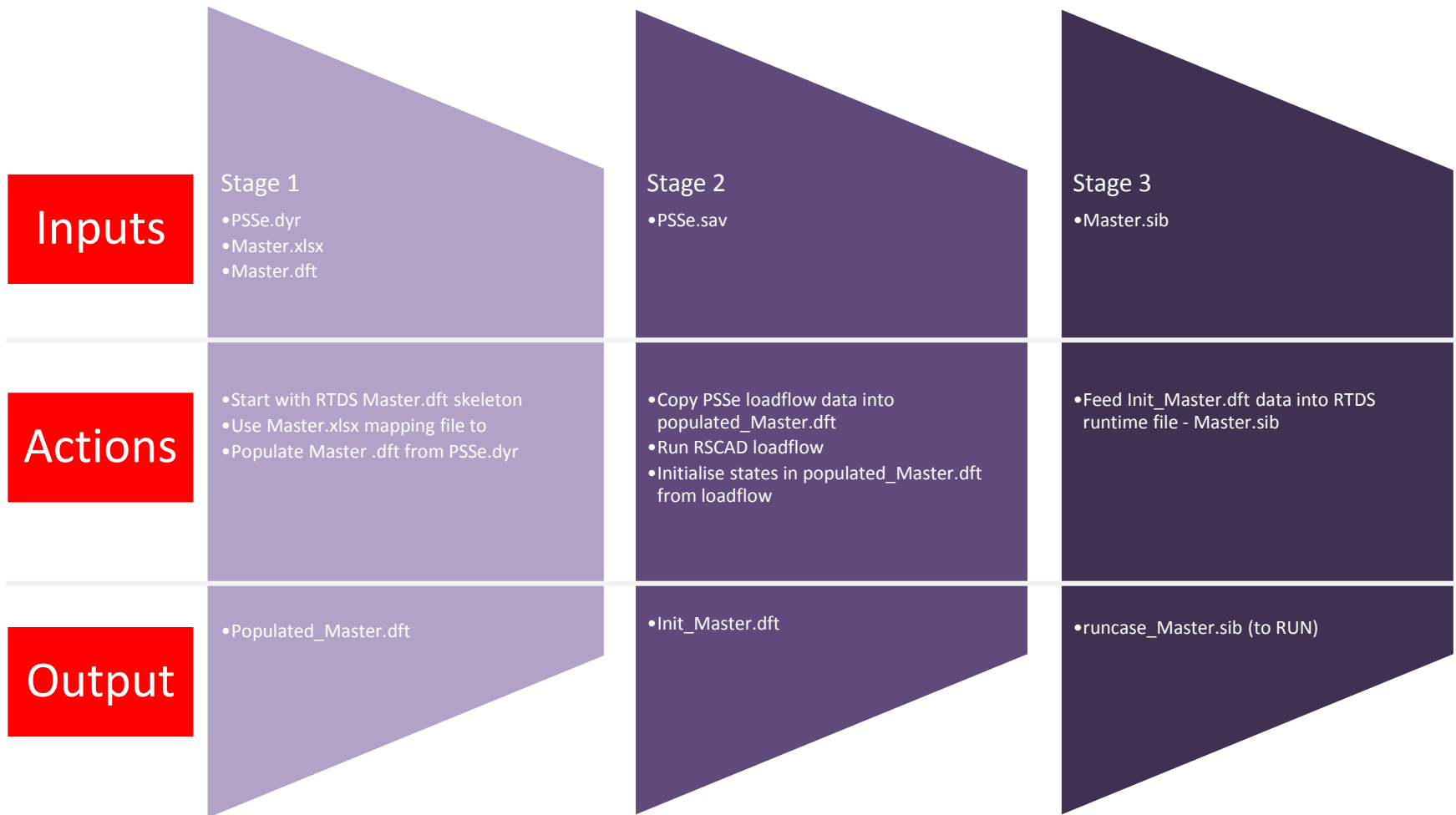


# Automation tools for power system model creation and verification of RTDS models

Luke Roberts  
2 Oct 2019

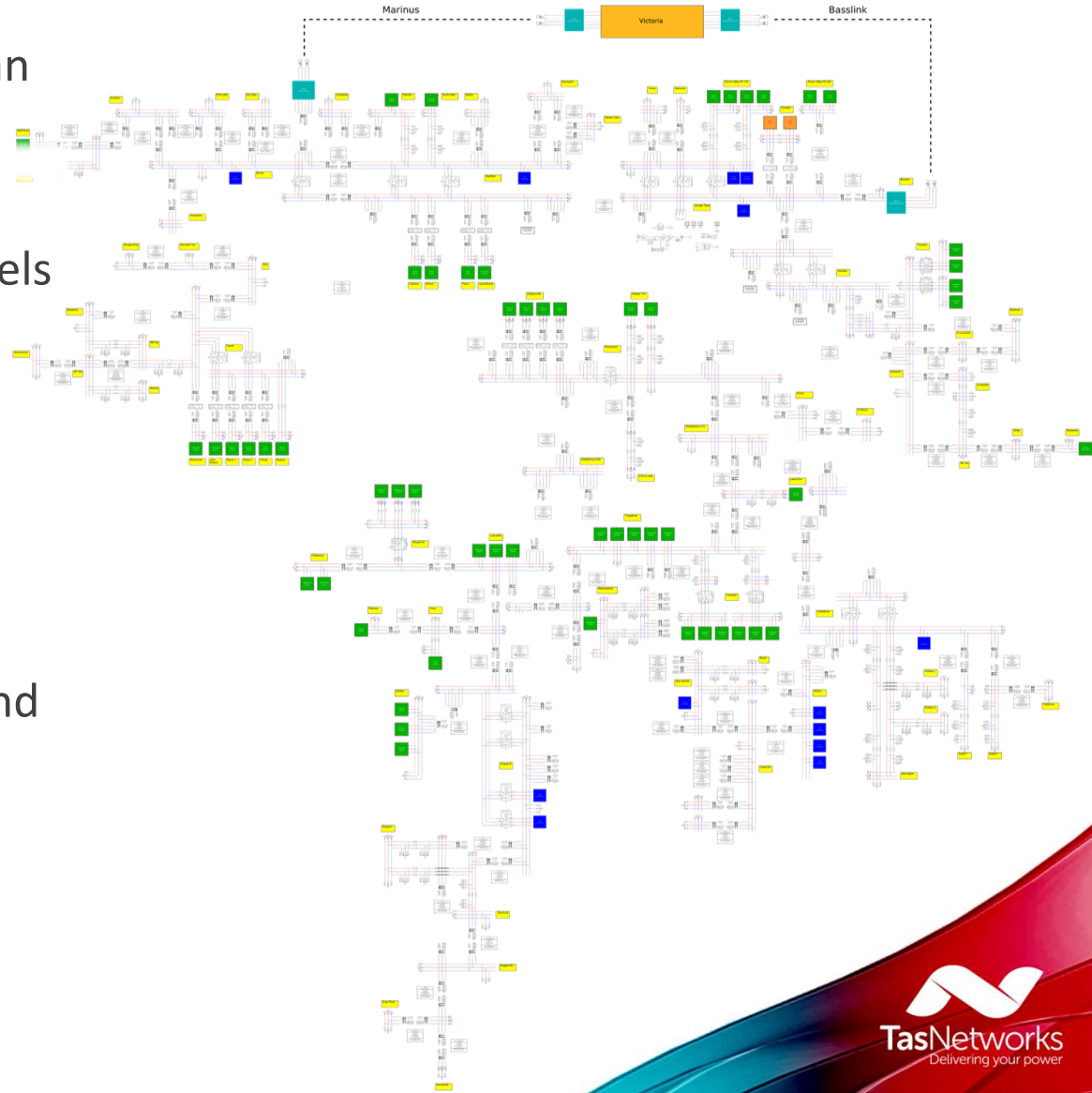
# TasNetworks Developments



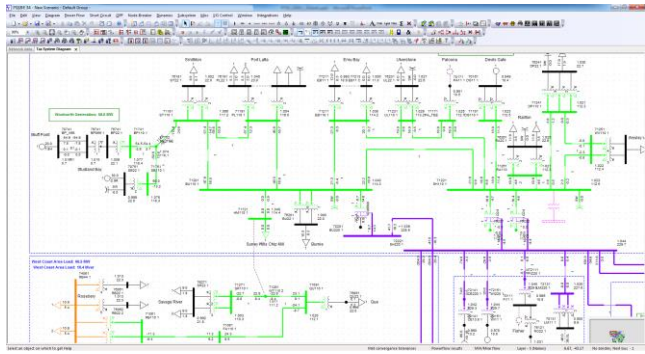
PSS/e to RSCAD User model conversion tool

# Modelling Challenge

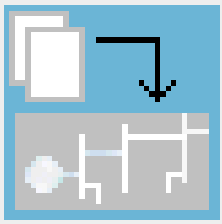
- Model of the entire Tasmanian transmission network
- Majority of user written models
- Flexibility and repeatability
- Roughly geographical layout
- Premade faults, sequences and monitoring



# Process



+



Convert

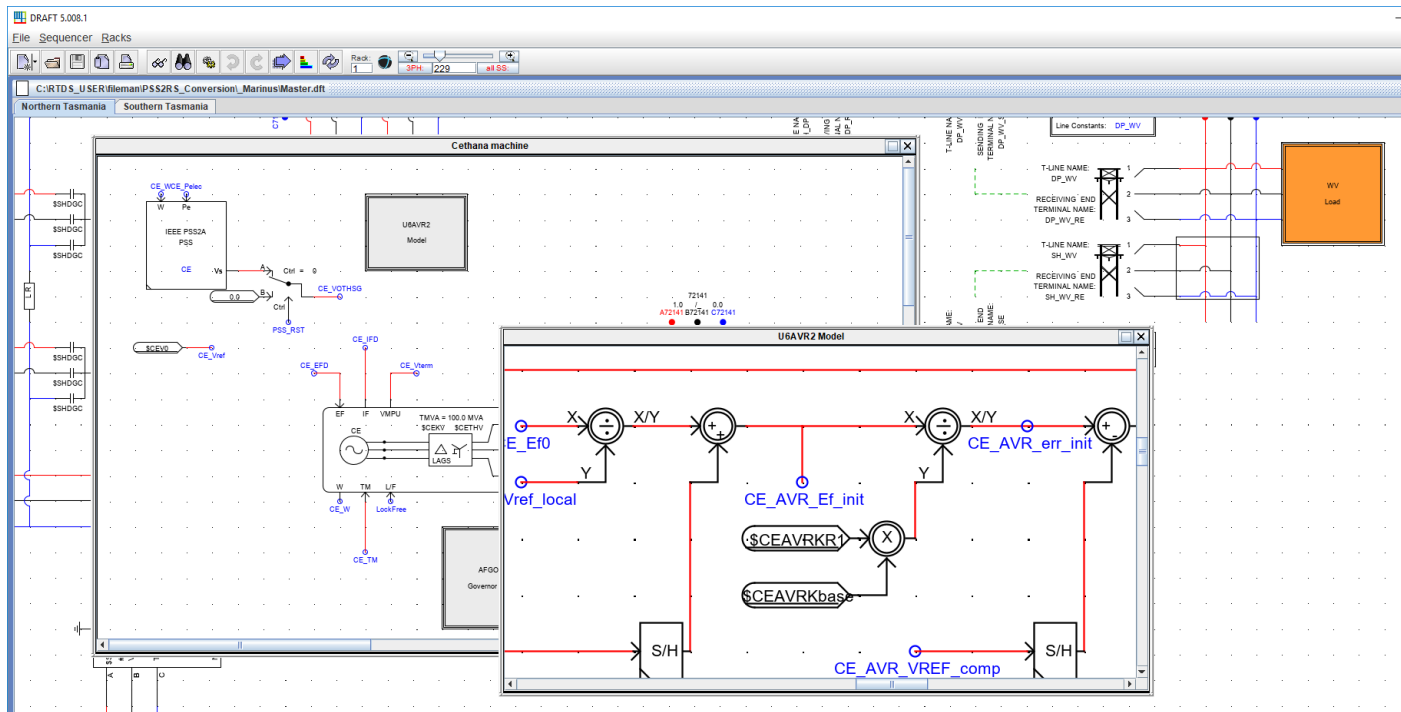
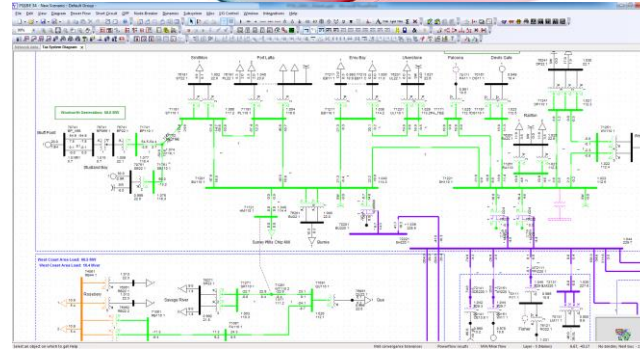
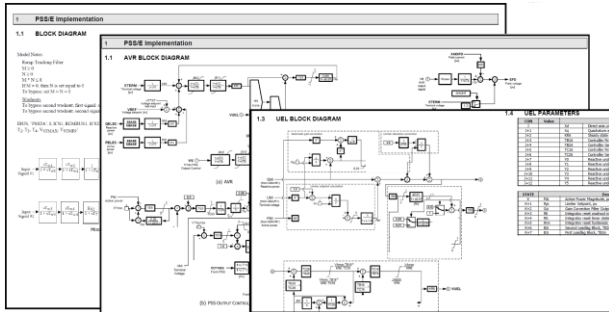
=

```

175
176
177 SH_PA.6
178 6 0 #3d #3d 50.00 50.00 1.000000 0.0 0.0 /
179 #3d #3d 0.053724 891.644808 13.312117 13.312117
180 4.082483e-01 9.128709e-01 0.000000e+00 0.000000e+00 /
181 #3d #3d 0.038374 356.657923 0.887474 0.887474
182 4.082483e-01 -1.825742e-01 8.944272e-01 0.000000e+00 0.000000e+00 /
183 #3d #3d 0.038374 356.657923 0.887474 0.887474
184 4.082483e-01 -1.825742e-01 -2.236068e-01 8.660254e-01 0.000000e+00 /
185 #3d #3d 0.038374 356.657923 0.887474 0.887474
186 4.082483e-01 -1.825742e-01 -2.236068e-01 8.164967e-01 0.000000e+00 /
187 #3d #3d 0.038374 356.657923 0.887474 0.887474
188 4.082483e-01 -1.825742e-01 -2.236068e-01 -2.886752e-01 4.082483e-01 7.071068e-01 /
189 #3d #3d 0.038374 356.657923 0.887474 0.887474
190 4.082483e-01 -1.825742e-01 -2.236068e-01 -2.886752e-01 -4.082483e-01 -7.071068e-01 /
191
192
193 DP_WV.3
194 3 0 #3d #3d 50.00 50.00 1.000000 0.0 0.0 /
195 #3d #3d 0.048203 908.898384 22.161150 22.161150 5.773503e-01 8.164967e-01 0.000000e+00 /
196 #3d #3d 0.034430 363.559754 1.477410 1.477410 5.773503e-01 -4.082483e-01 7.071068e-01 /
197 #3d #3d 0.034430 363.559754 1.477410 1.477410 5.773503e-01 -4.082483e-01 -7.071068e-01 /
198
199
200 SR_WT.3
201 3 0 #3d #3d 50.00 50.00 1.000000 0.0 0.0 /
202 #3d #3d 0.114445 910.744980 53.161350 53.161350 5.773503e-01 8.164967e-01 0.000000e+00 /
203 #3d #3d 0.081747 364.297992 3.544090 3.544090 5.773503e-01 -4.082483e-01 7.071068e-01 /
204 #3d #3d 0.081747 364.297992 3.544090 3.544090 5.773503e-01 -4.082483e-01 -7.071068e-01 /
205
206
207 FA_MA7.3
208 3 0 #3d #3d 50.00 50.00 1.000000 0.0 0.0 /
209 #3d #3d 0.011540 842.270397 1.107150 1.107150 5.773503e-01 8.164967e-01 0.000000e+00 /
210 #3d #3d 0.008243 336.908159 0.073810 0.073810 5.773503e-01 -4.082483e-01 7.071068e-01 /
211 #3d #3d 0.008243 336.908159 0.073810 0.073810 5.773503e-01 -4.082483e-01 -7.071068e-01 /
212
213
214 FA_MA8.3
215 3 0 #3d #3d 50.00 50.00 1.000000 0.0 0.0 /
216 #3d #3d 0.011540 842.270397 1.107150 1.107150 5.773503e-01 8.164967e-01 0.000000e+00 /
  
```

tlines

# Process



# Mapping

\$XXXYYYZZZ

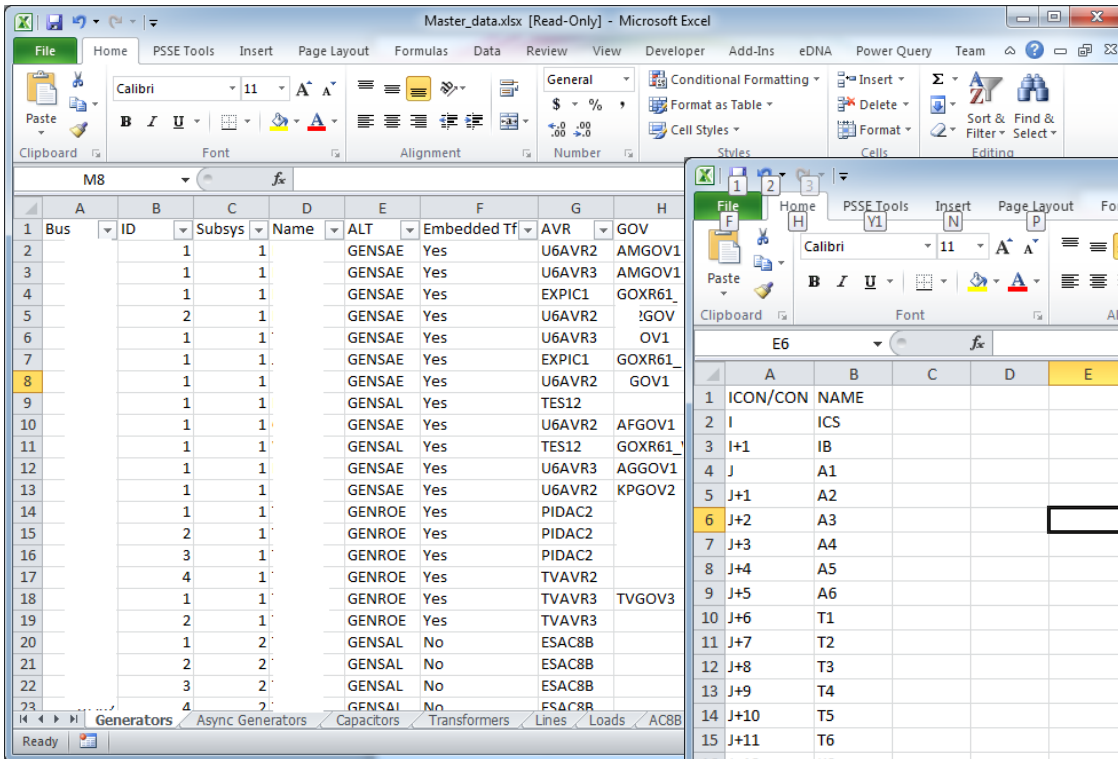
Generator identifier    Model identifier    Model parameter

\$G01GOVMSmax

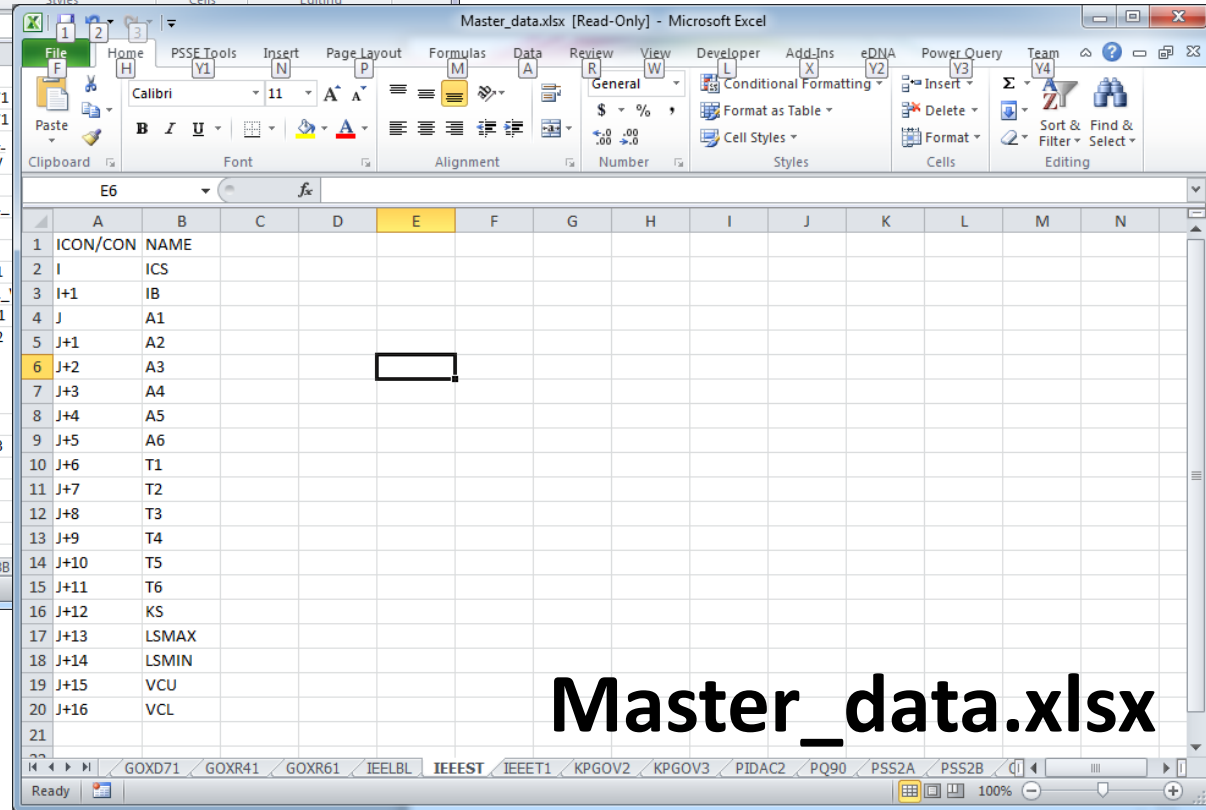


1.0...

# Process



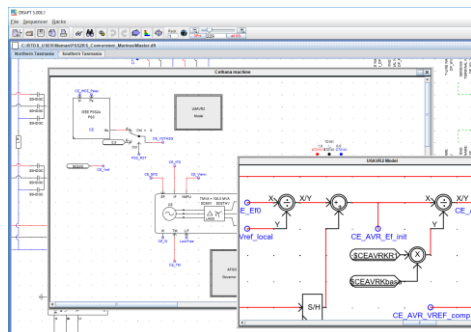
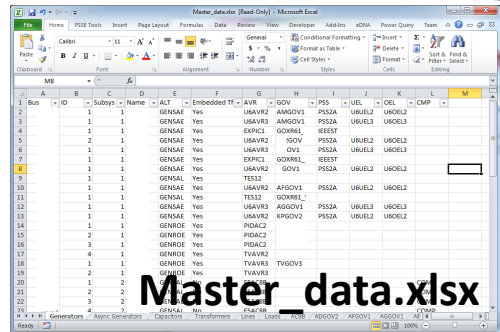
	A	B	C	D	E	F	G	H
1	Bus	ID	Subsys	Name	ALT	Embedded Tf	AVR	GOV
2		1	1	GENSAE	Yes	U6AVR2	AMGOV1	
3		1	1	GENSAE	Yes	U6AVR3	AMGOV1	
4		1	1	GENSAE	Yes	EXPIC1	GOXR61	
5		2	1	GENSAE	Yes	U6AVR2	!GOV	
6		1	1	GENSAE	Yes	U6AVR3	OV1	
7		1	1	GENSAE	Yes	EXPIC1	GOXR61	
8		1	1	GENSAE	Yes	U6AVR2	GOV1	
9		1	1	GENSAL	Yes	TES12		
10		1	1	GENSAE	Yes	U6AVR2	AFGOV1	
11		1	1	GENSAL	Yes	TES12	GOXR61	
12		1	1	GENSAE	Yes	U6AVR3	AGGOV1	
13		1	1	GENSAE	Yes	U6AVR2	KPGOV2	
14		1	1	GENROE	Yes	PIDAC2		
15		2	1	GENROE	Yes	PIDAC2		
16		3	1	GENROE	Yes	PIDAC2		
17		4	1	GENROE	Yes	TVAVR2		
18		1	1	GENROE	Yes	TVAVR3	TVGOV3	
19		2	1	GENROE	Yes	TVAVR3		
20		1	2	GENSAL	No	ESAC8B		
21		2	2	GENSAL	No	ESAC8B		
22		3	2	GENSAL	No	ESAC8B		
23		4	2	GENSAL	No	ESAC8B		



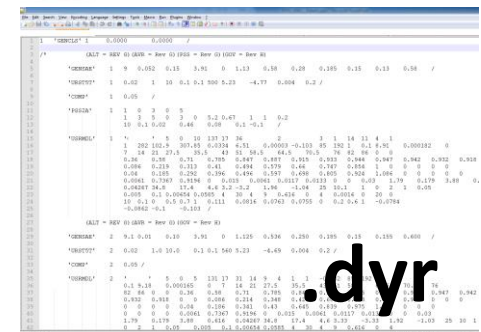
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	ICON/CON	NAME												
2	I	ICS												
3	I+1	IB												
4	J	A1												
5	J+1	A2												
6	J+2	A3												
7	J+3	A4												
8	J+4	A5												
9	J+5	A6												
10	J+6	T1												
11	J+7	T2												
12	J+8	T3												
13	J+9	T4												
14	J+10	T5												
15	J+11	T6												
16	J+12	KS												
17	J+13	LSMAX												
18	J+14	LSMIN												
19	J+15	VCU												
20	J+16	VCL												

# Master\_data.xlsx

# Process

Bus	ID	Subsys	Name	ALT	Embedded TI	AVR	GOV	PSS	UEL	DEL	CMP
1	1	1	GENAE	Yes	USAVR2	AMGOV1	PSS2A	UUEL2	UDEL2		
3	1	1	GENAE	Yes	USAVR3	AMGOV1	PSS2A	UUEL3	UDEL3		
4	1	1	GENAE	Yes	USP11	GOV1	IEEST				
5	2	1	GENAE	Yes	USAVR2	GOV1	PSS2A	UUEL2	UDEL2		
7	1	1	GENAE	Yes	USP11	GOV1	IEEST				
10	1	1	GENAE	Yes	USAVR3	DV1	PSS2A	UUEL3	UDEL3		
11	1	1	GENAE	Yes	USAVR3	DV1	PSS2A	UUEL3	UDEL3		
12	1	1	GENAE	Yes	TSS12	GOV1					
13	1	1	GENAE	Yes	USAVR2	AMGOV1	PSS2A	UUEL2	UDEL2		
14	1	1	GENAE	Yes	USAVR2	AMGOV1	PSS2A	UUEL2	UDEL2		
15	2	1	GENRICE	Yes	PIDAC2						
16	3	1	GENRICE	Yes	PIDAC2						
17	4	1	GENRICE	Yes	TVAVR2						
18	1	1	GENRICE	Yes	TVAVR3						
19	2	1	GENRICE	Yes	TVAVR3						
20	1	2	GENRICE	Yes	TVAVR3						
21	2	2	GENRICE	Yes	TVAVR3						
22	3	2	GENRICE	Yes	TVAVR3						

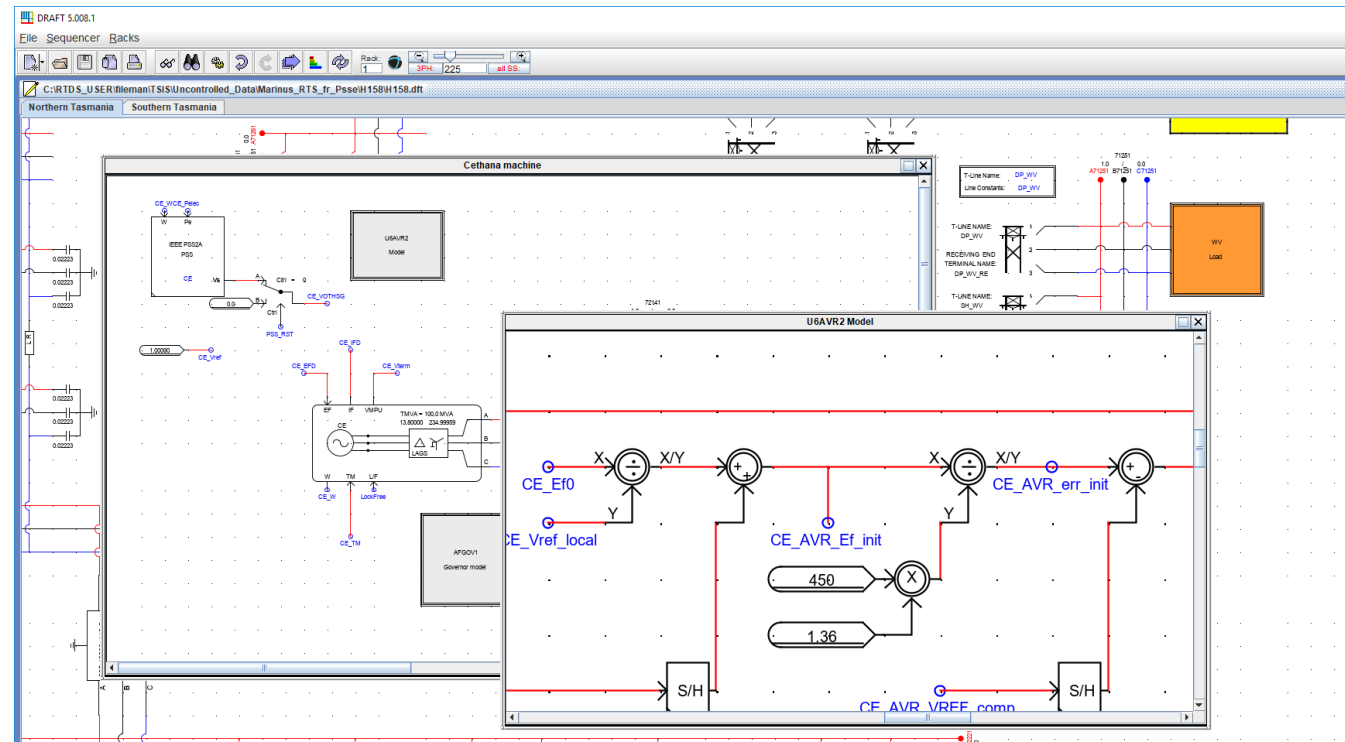



Matrix 1

1	0.0000	0.0000	...
2	0.0000	0.0000	...
3	0.0000	0.0000	...
4	0.0000	0.0000	...
5	0.0000	0.0000	...
7	0.0000	0.0000	...
10	0.0000	0.0000	...
11	0.0000	0.0000	...
12	0.0000	0.0000	...
13	0.0000	0.0000	...
14	0.0000	0.0000	...
15	0.0000	0.0000	...
16	0.0000	0.0000	...
17	0.0000	0.0000	...
18	0.0000	0.0000	...
19	0.0000	0.0000	...
20	0.0000	0.0000	...
21	0.0000	0.0000	...
22	0.0000	0.0000	...

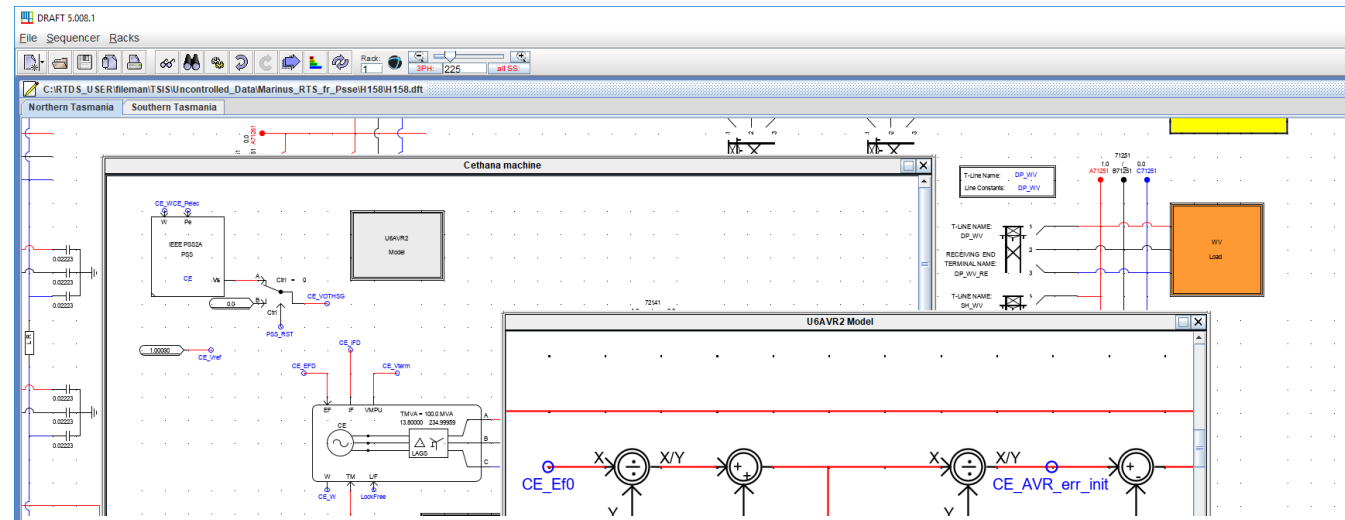
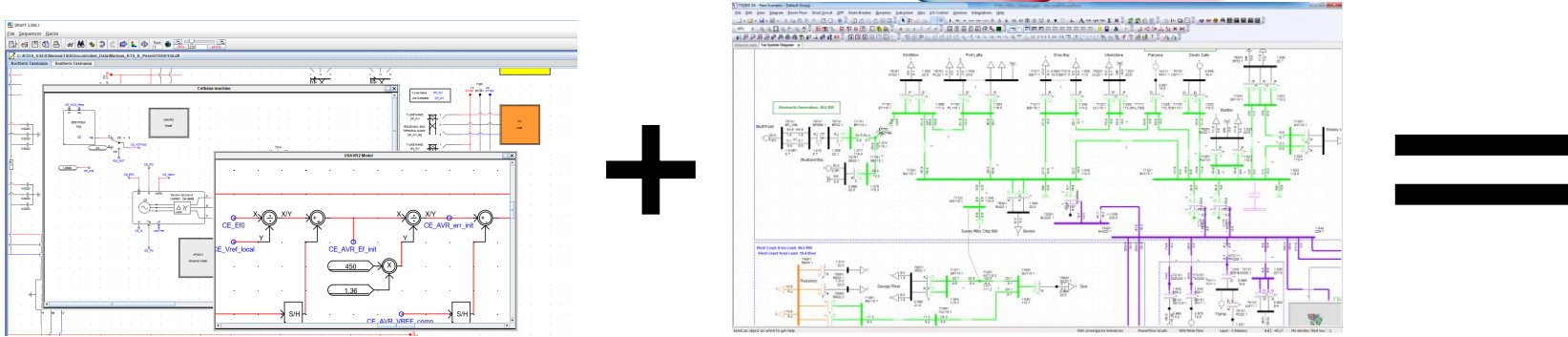
Master\_data.xlsx

.dyr



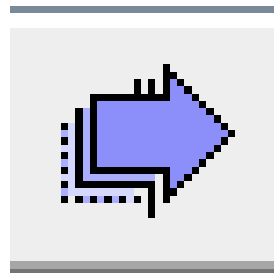
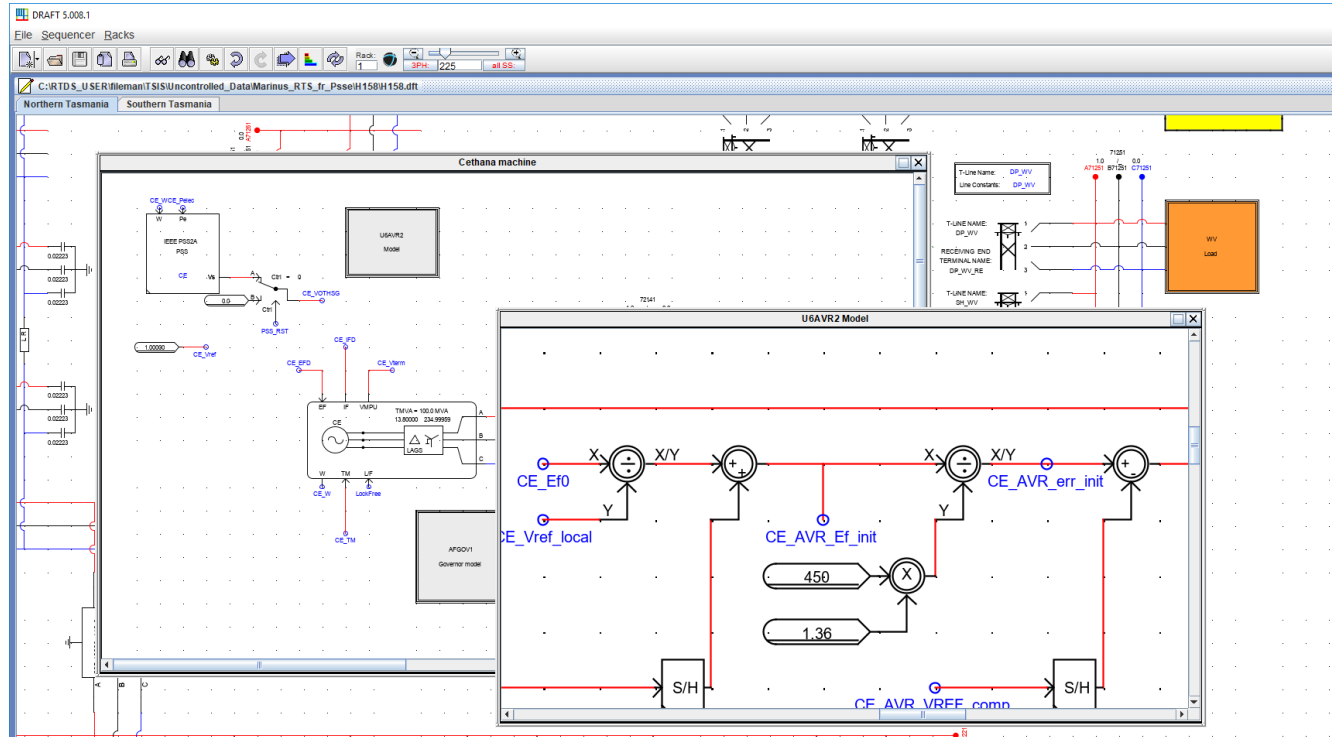


# Process

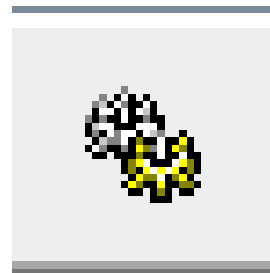


**Loadflow values:**  
**Machine P0, V0 and status, line outages, capacitor bank status, load P0 and Q0, DC link power**

# Process

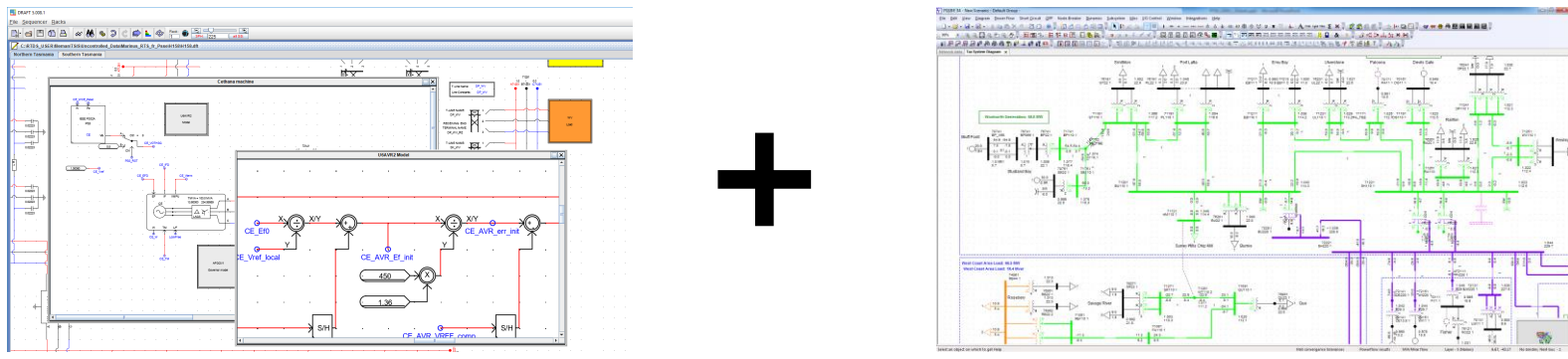


**Loadflow**



**Compile**

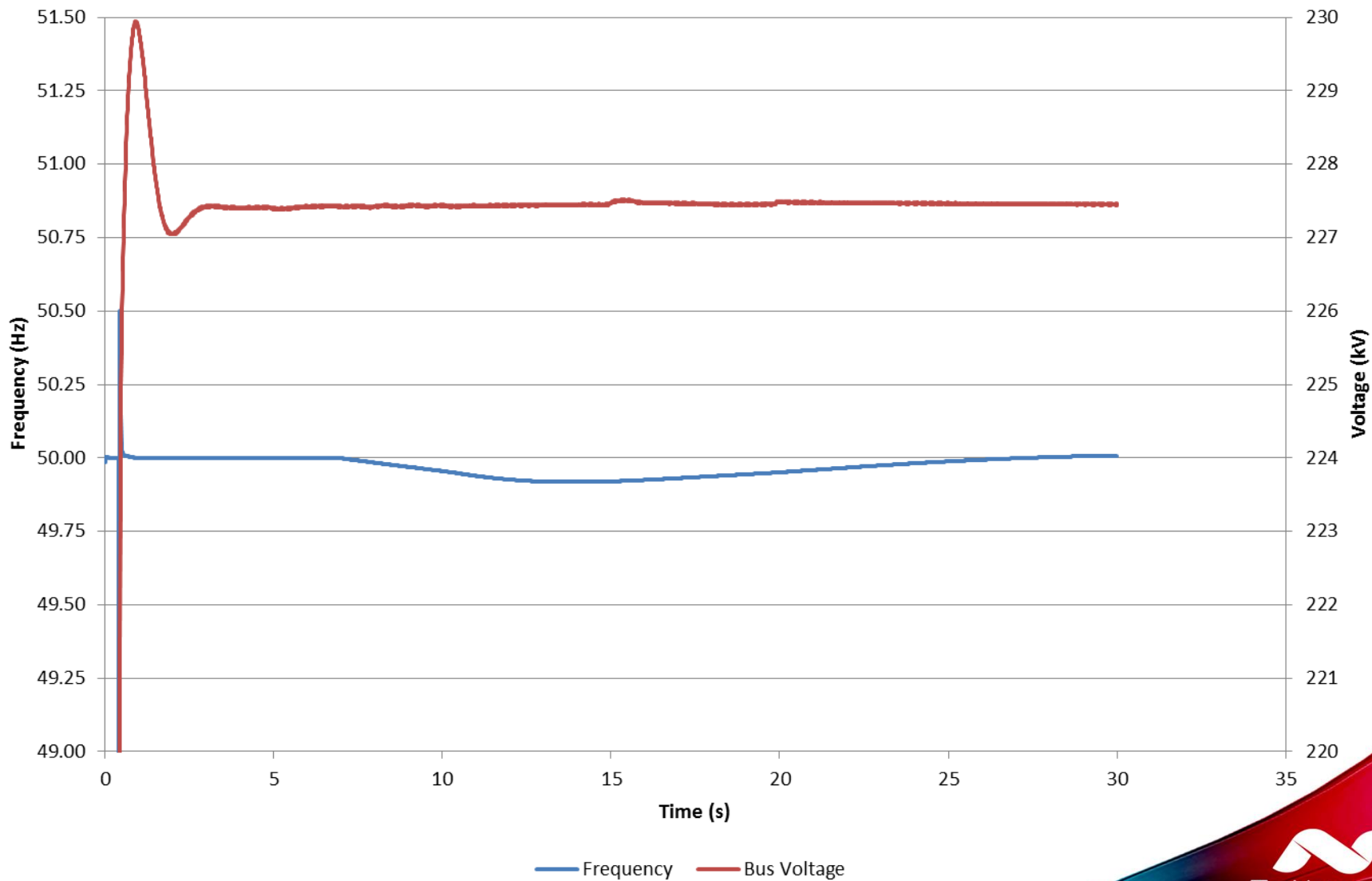
# Process



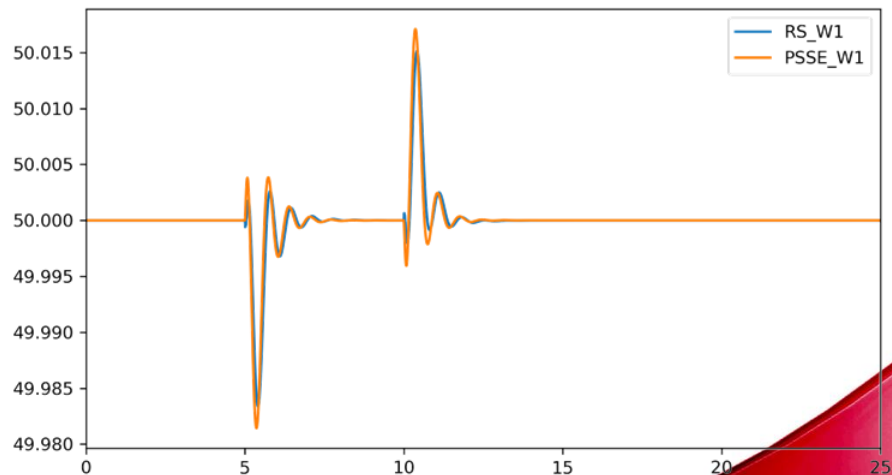
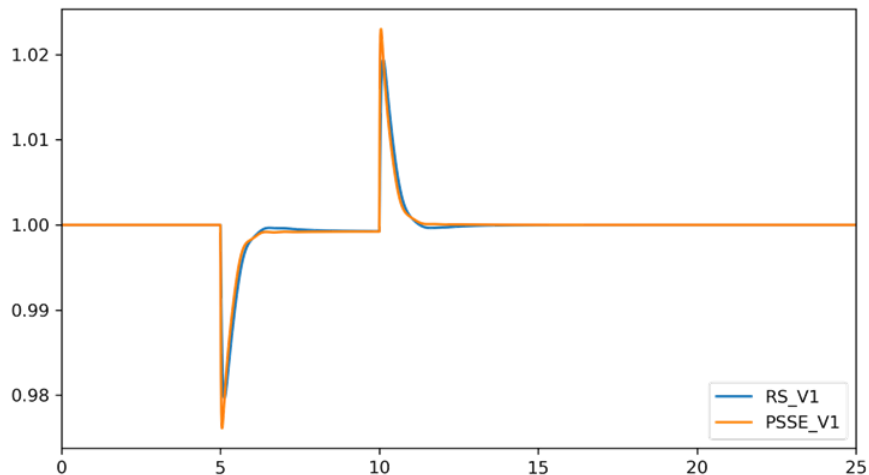
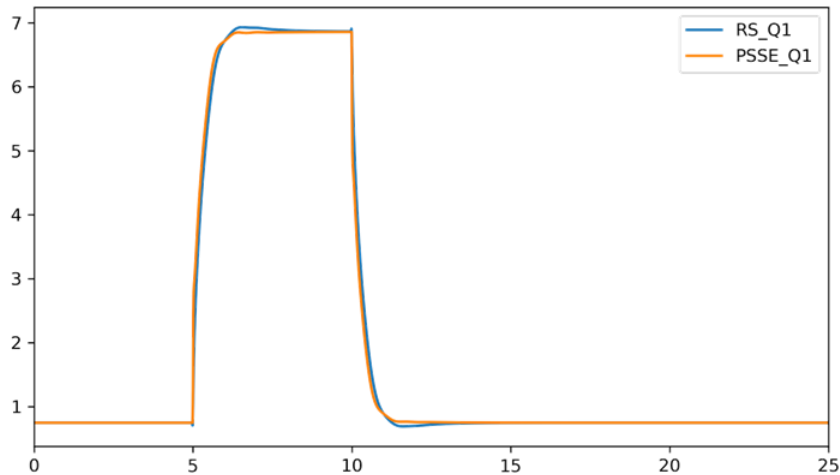
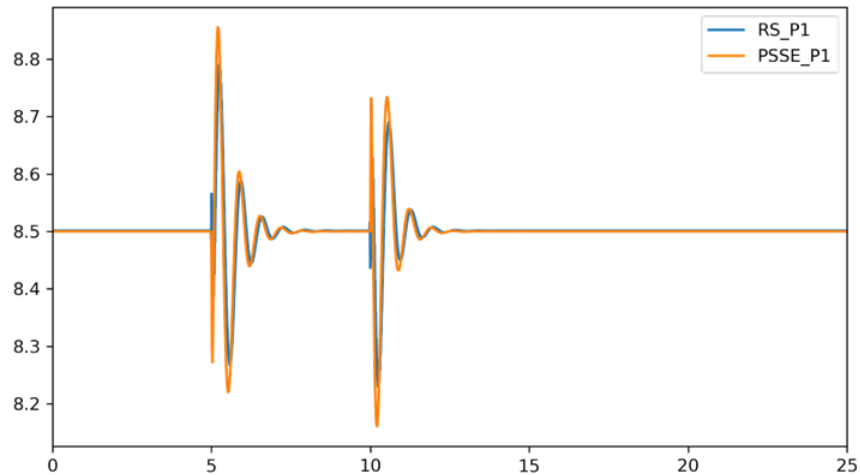
- **Swing bus error**
- **Top 10 bus voltage errors**
- **Selected line flow errors**



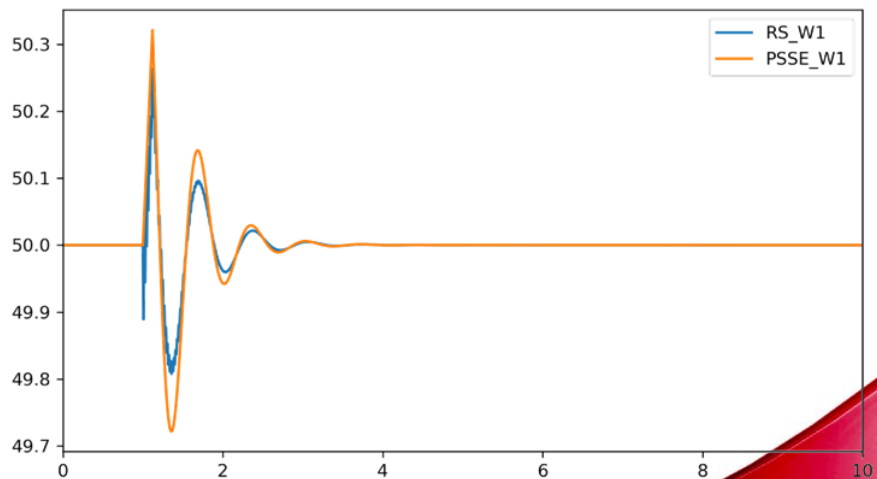
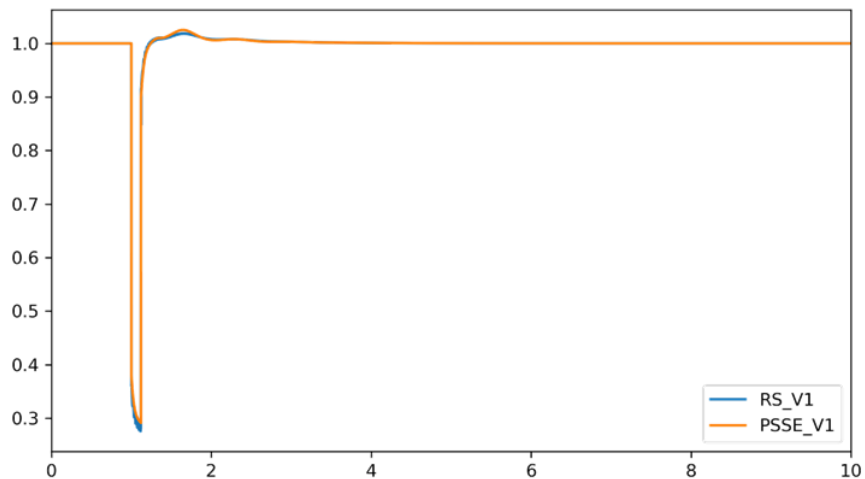
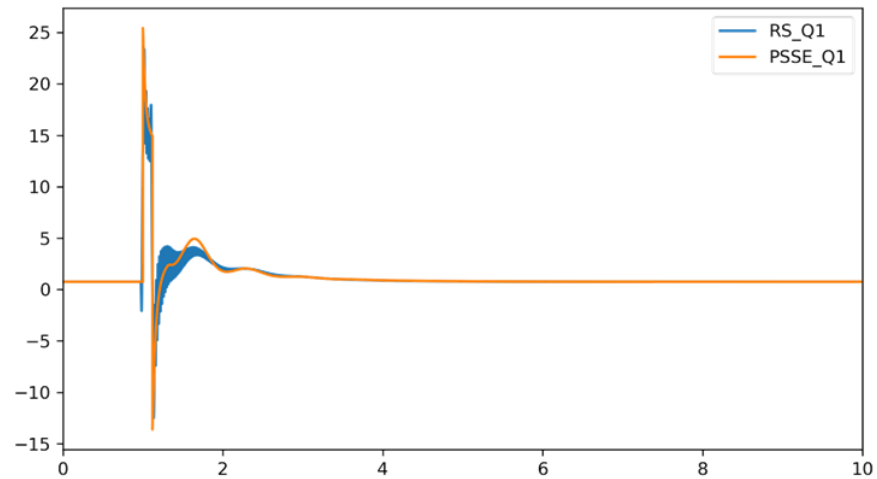
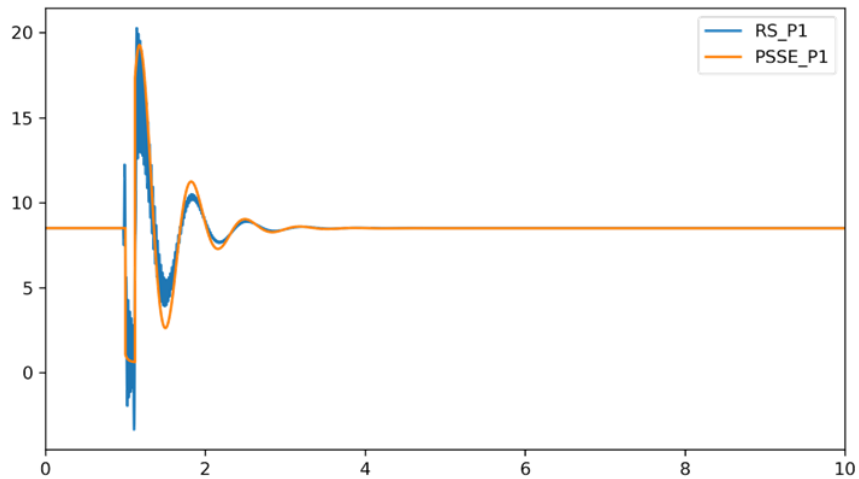
# Case start up



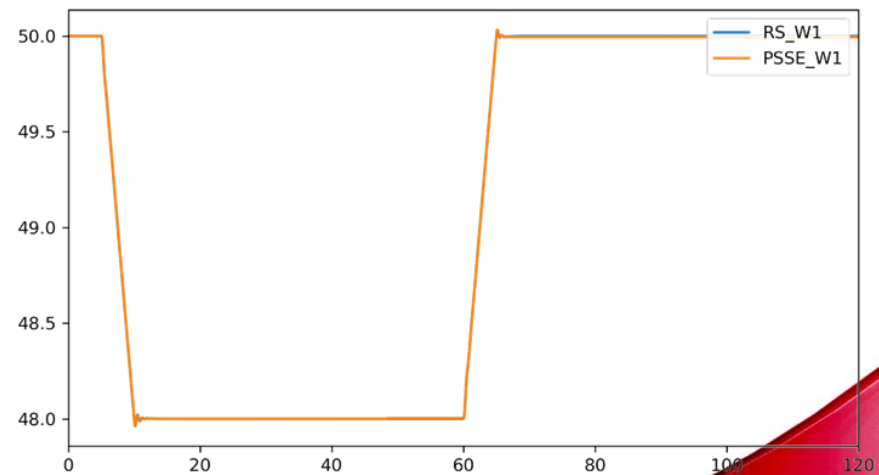
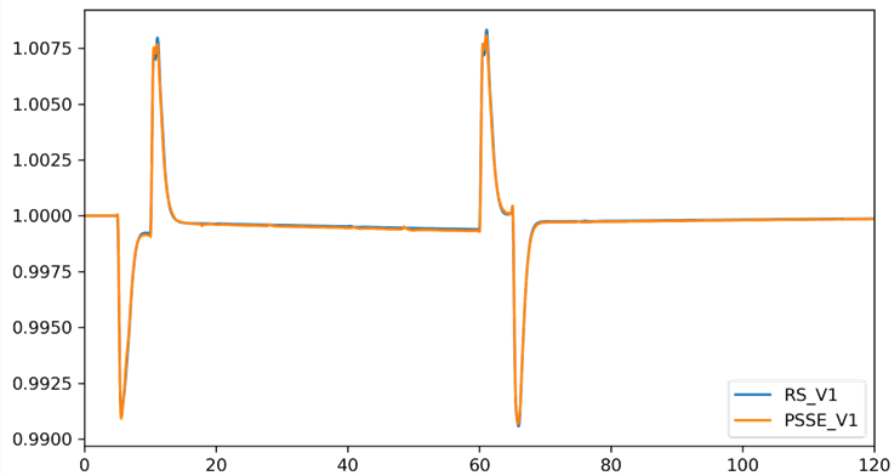
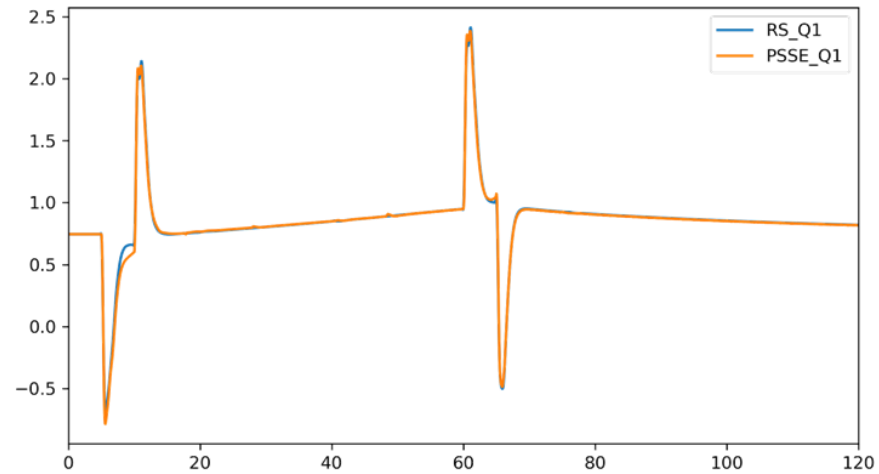
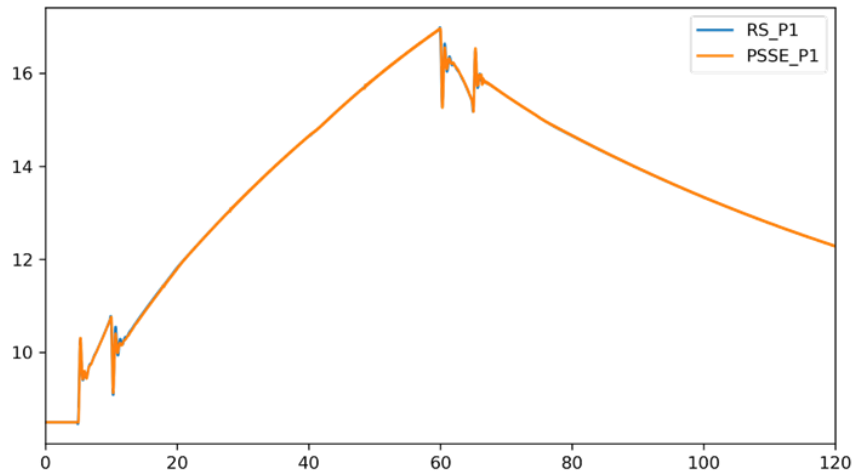
# Results comparisons



# Results comparisons

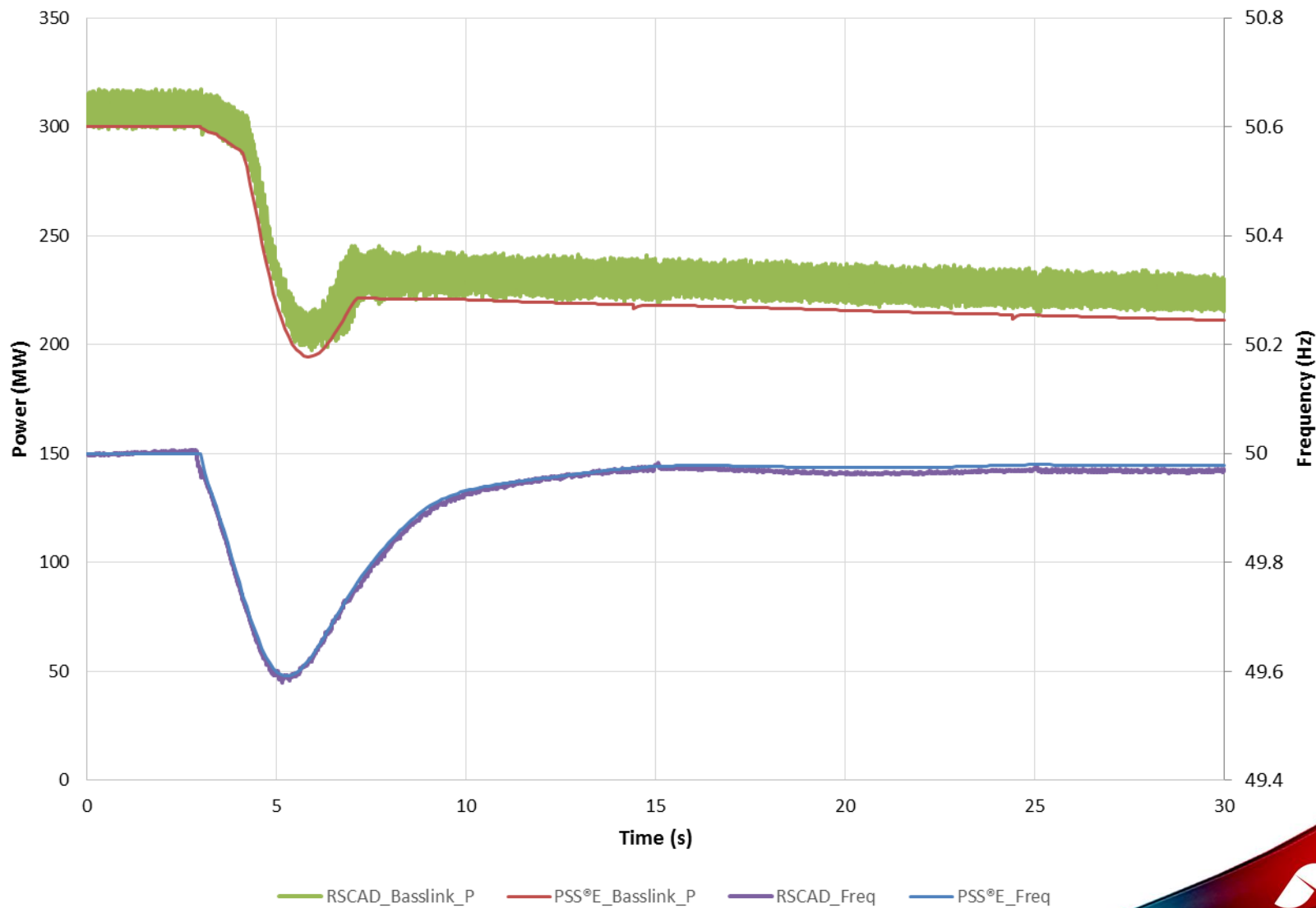


# Results comparisons

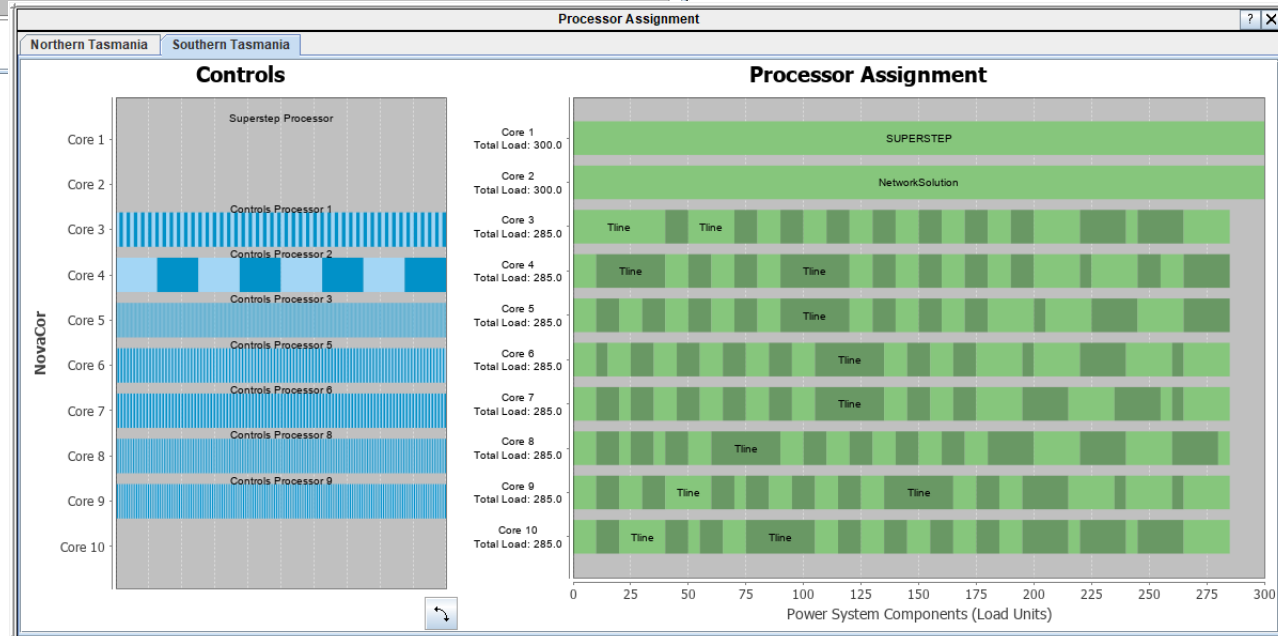
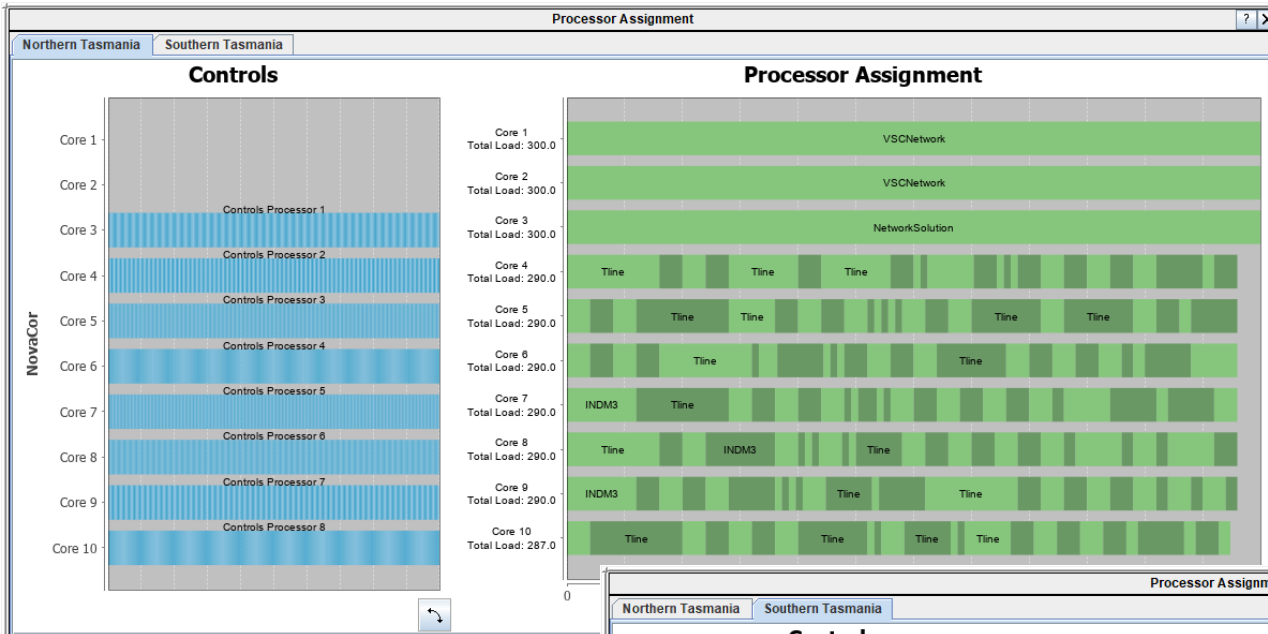




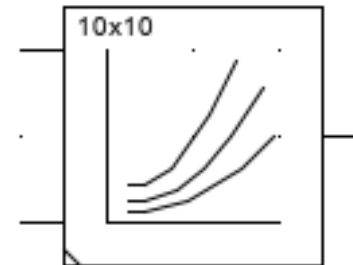
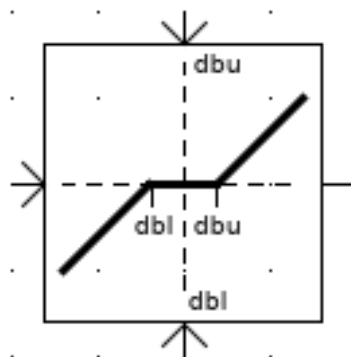
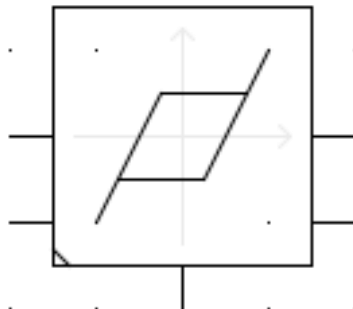
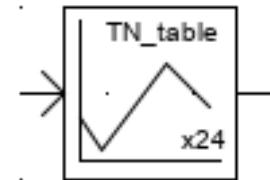
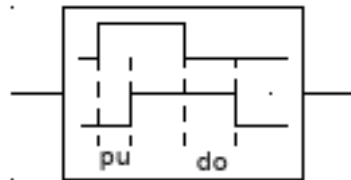
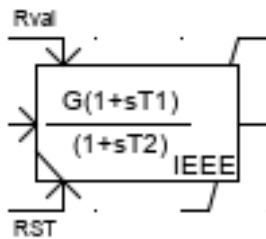
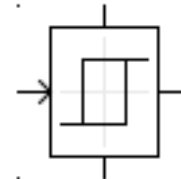
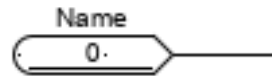
# Generator Contingency



# Observations



# Observations



Thank you

