

Upper South Island (USI) Security

Winter 2011 Planning Update
20th May 2011



SYSTEM OPERATOR

USI Forum

- Purpose
 - Update USI participants on information and studies completed to date for Winter 2011.
- Approach
 - Gathered information about winter security issues for Upper South Island.
 - Assumptions made for peak load, power factor, and regional generation availability.
 - Voltage stability limits reviewed across a range of scenarios with currently available information, limits indicative only.
 - Determine whether a contingency plan is required.



Winter 2011 – Scenarios Studied

- Potential scenarios considered:
 - All equipment in service
 - Low regional generation
 - TKA/TKB generator outages

| Scenario | TKB | TKA |
|----------|-----------|-------------|
| 1 | 2 x 80 MW | 1 x 25 MW |
| 2 | 1 x 80 MW | 1 x 12.5 MW |
| 3 | Out | Out |



Winter 2011 – Assumptions

- Generation:

| Station | Generation (MW) |
|--------------|-----------------|
| Arnold | 3 |
| Argyle | 10 |
| Cobb | 25 |
| Coleridge | 28 |
| Highbank | 24 |
| Kumara | 9 |
| Tekapo A | 24 |
| Tekapo B | 160 |
| Total | 283 |



Winter 2011 – Assumptions

- Load:

| | 2010 Regional Peak** (MW) | Expected Forecast Load for 2011 (MW) | <i>Expected</i> Forecast Difference from 2010 | Prudent Forecast Load for 2011 (MW) | <i>Prudent</i> Forecast Difference from 2010 |
|---------------------|---------------------------|---|---|--|--|
| Alpine Energy* | 77 | 91 | 19% | 105 | 37% |
| Buller Networks | 11.4 | 14.5 | 27% | 15.0 | 32% |
| Electricity Ash | 50 | 62 | 23% | 66 | 31% |
| Mainpower | 89 | 99 | 11% | 102 | 15% |
| Marlborough Lines | 59 | 63 | 7% | 66 | 13% |
| Network Tasman | 136 | 150 | 10% | 159 | 16% |
| Orion Group | 611 | 680 | 11% | 717 | 17% |
| Westpower | 33 | 33 | 0% | 35 | 6% |
| Total Zone 3 | 1066 | 1192 | 12% | 1264 | 19% |

- No load control assumed.
- 2010 USI Peak recorded on 23 June at 17:40.
- 2011 Expected/Prudent network loads supplied by distributors and diversified.
- * Alpine Energy load does not include STU loadings.
- ** Actual peaks as recorded concurrent to the Zone 3 2010 peak – individual peaks for network companies is likely to be higher.



Winter 2011 – Assumptions

- Zone 3 peak power factor of 0.996
- Islington dynamic reactive support
 - SVC3: -50/+59 MVar capacity
 - SVC9: +150/-75 MVar capacity
- Kikiwa STATCOMs
 - 2 x 20MVar
- HVDC = 400 MW North
- Rest of the South Island modelled for GZ loads as per winter peak



Winter 2011 – Outages

- Notified generator outages (as per POCP 18/05/11).

| POCP | Gen | Jun-2011 | | | | | | | | | | | | | | Jul-2011 | | | | | | | | | | | | | | | | |
|--------------|---------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|
| starting: | | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | | | |
| Outage Block | MW Loss | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 01 |
| OHA | 164 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OHA | 164 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| POCP | Gen | Aug-2011 | | | | | | | | | | | | | | Sep-2011 | | | | | | | | | | | | | | | | |
|--------------|---------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|
| starting: | | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Sun | | | |
| Outage Block | MW Loss | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 01 |
| TKB2 | 80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OHA | 164 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TKA1 | 25.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TKB3 | 80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OHA | 164 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Winter 2011 – Outages

- Notified transmission outages (as per POCP 19/05/11) to be managed through the normal outage planning process.

| Outage Block | Start | End | Type | Planning Status |
|-------------------|------------------|------------------|------------|-----------------|
| ABY_TIM_1 | 14/07/2011 07:30 | 14/07/2011 18:30 | daily | Tentative |
| ABY_TKA_1 | 14/07/2011 07:30 | 14/07/2011 18:30 | daily | Confirmed |
| ASB_BRY_1 | 10/08/2011 07:30 | 11/08/2011 17:30 | daily | Tentative |
| BEN_OHB_1 | 27/06/2011 07:00 | 1/07/2011 18:00 | continuous | Confirmed |
| BEN_OHC_2 | 26/07/2011 07:30 | 26/07/2011 16:30 | daily | Tentative |
| BEN_TWZ_1 | 30/05/2011 07:00 | 4/06/2011 18:00 | continuous | Confirmed |
| | 13/08/2011 07:30 | 13/08/2011 18:00 | daily | Tentative |
| | 27/08/2011 07:30 | 27/08/2011 18:00 | daily | Tentative |
| ISL_SC_5 | 30/05/2011 10:00 | 1/06/2011 15:00 | daily | Confirmed |
| | 19/06/2011 10:00 | 19/06/2011 15:00 | daily | Confirmed |
| | 4/08/2011 07:30 | 4/08/2011 17:30 | daily | Tentative |
| ISL_SVC_3 | 31/08/2011 07:30 | 1/09/2011 17:30 | daily | Tentative |
| ISL_SVC_9 | 5/06/2011 10:00 | 5/06/2011 15:00 | daily | Confirmed |
| | 19/06/2011 10:00 | 19/06/2011 15:00 | daily | Confirmed |
| ISL_WPR_CUL_KIK_3 | 20/06/2011 07:30 | 24/06/2011 17:30 | continuous | Confirmed |
| OHA_TWZ_1 | 25/06/2011 07:30 | 25/06/2011 18:00 | daily | Confirmed |
| | 6/08/2011 07:30 | 6/08/2011 18:00 | daily | Tentative |
| OHB_TWZ_3 | 18/06/2011 07:30 | 18/06/2011 18:00 | daily | Confirmed |
| OHC_TWZ_4 | 27/08/2011 07:30 | 27/08/2011 18:00 | daily | Tentative |
| TKB_TWZ_1 | 18/06/2011 07:30 | 18/06/2011 18:00 | daily | Confirmed |
| | 13/08/2011 07:30 | 13/08/2011 18:00 | daily | Tentative |



Winter 2011 – Stability Limits

- Zone 3 voltage stability limits calculated with currently available information

| Scenario | Power Factor | N-1 Stability Limit | |
|----------|--------------|---------------------|---------------------|
| | | Contingency | USI Load Limit (MW) |
| 1 | 0.996 | ISL_TKB cct | 1352 |
| 2 | 0.996 | ISL_TKB cct | 1347 |
| 3 | 0.996 | ISL_LIV cct | 1337 |

➤ Approximately 30 MW of additional benefit if AUVLS is armed.



Winter 2011 – Summary

- With currently available information, studies show that the forecast USI peak winter demand can be met with n-1 security under all study scenarios.
- Based on margins available no current requirements for:
 - NIWA report
 - USI Contingency plan
- Will be re-assessed if situation changes:
 - Unexpected outages on generators
 - Unexpected outages on transmission plant
- Next update:
 - Reconvene if any generation/transmission issues arise.

