Resilience planning focus and implementation strategies

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Orion your NETWORK

Introduction

- Orion New Zealand Ltd
  - third largest NZ lines company

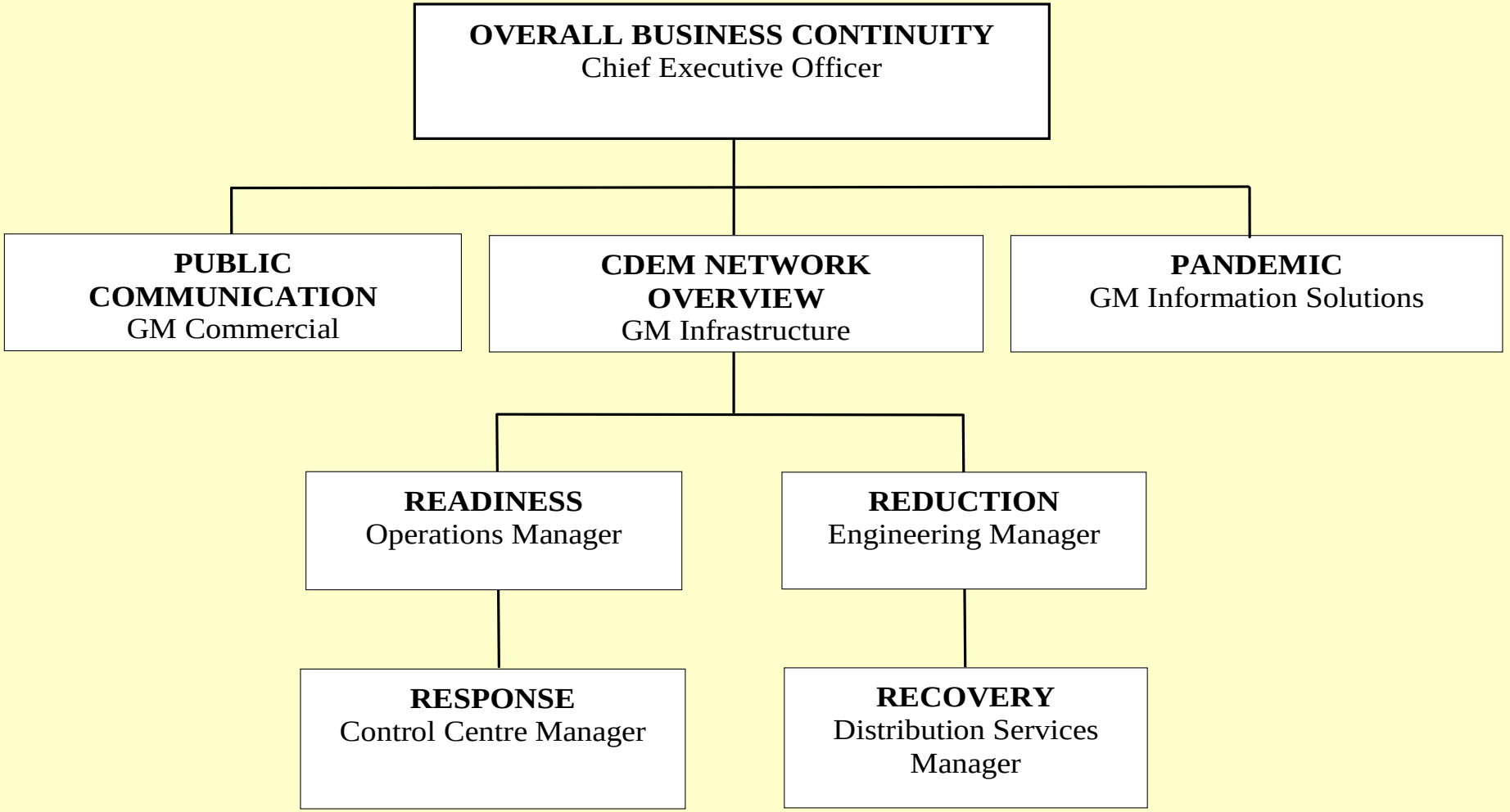
- Company emergency preparedness culture
  - Reduction – risk reduction
  - Readiness – operational planning
  - Response – centralised response & control
  - Recovery – restoration of a robust service

Interdependence

THESE ARE DEPENDENT ON THESE ↓	Water Supply	Sanitary Drainage	Storm Drainage	Mains Electricity	Standby Electricity	VHF Radio	Telephone Systems	Roading	Railways	Sea Transport	Air Transport	Broadcasting	Fuel Supply	Fire Fighting
Water Supply		2	●	●	●	●	●	●	●	●	●	●	●	3
Sanitary Drainage	●		●	●	●	●	●	●	●	●	●	●	●	●
Storm Drainage	●	2		●	●	●	●	●	●	●	●	●	●	●
Mains Electricity	2	3	2		●	3	3	●	2	●	3	1	●	●
Standby Electricity	3	3	2	●		3	3	●	●	●	3	3	2	●
VHF Radio	1	1	2	3	●		3	2	2	2	2	2	●	3
Telephone Systems	2	1	●	1	1	●		●	●	●	1	3	1	2
Roading	2	2	2	3	2	2	2		2	3	3	2	3	3
Railways	●	●	●	●	●	●	●	●		1	●	●	●	●
Sea Transport	●	●	●	●	●	●	●	●	●		●	●	1	●
Air Transport	●	●	●	1	●	●	●	●	●	●		●	●	●
Broadcasting	1	2	●	●	●	●	1	1	●	●	●		●	1
Fuel Supply	3	2	1	●	3	2	1	3	2	●	1	1		3
Fire Fighting	●	●	●	●	●	●	1	●	●	●	2	●	1	
Equipment	3	3	2	3	3	2	3	3	3	3	3	3	2	2

Note: 3 = High Dependence
2 = Moderate Dependence
1 = Low Dependence
● = No Dependence

Orion – key emergency responsibilities

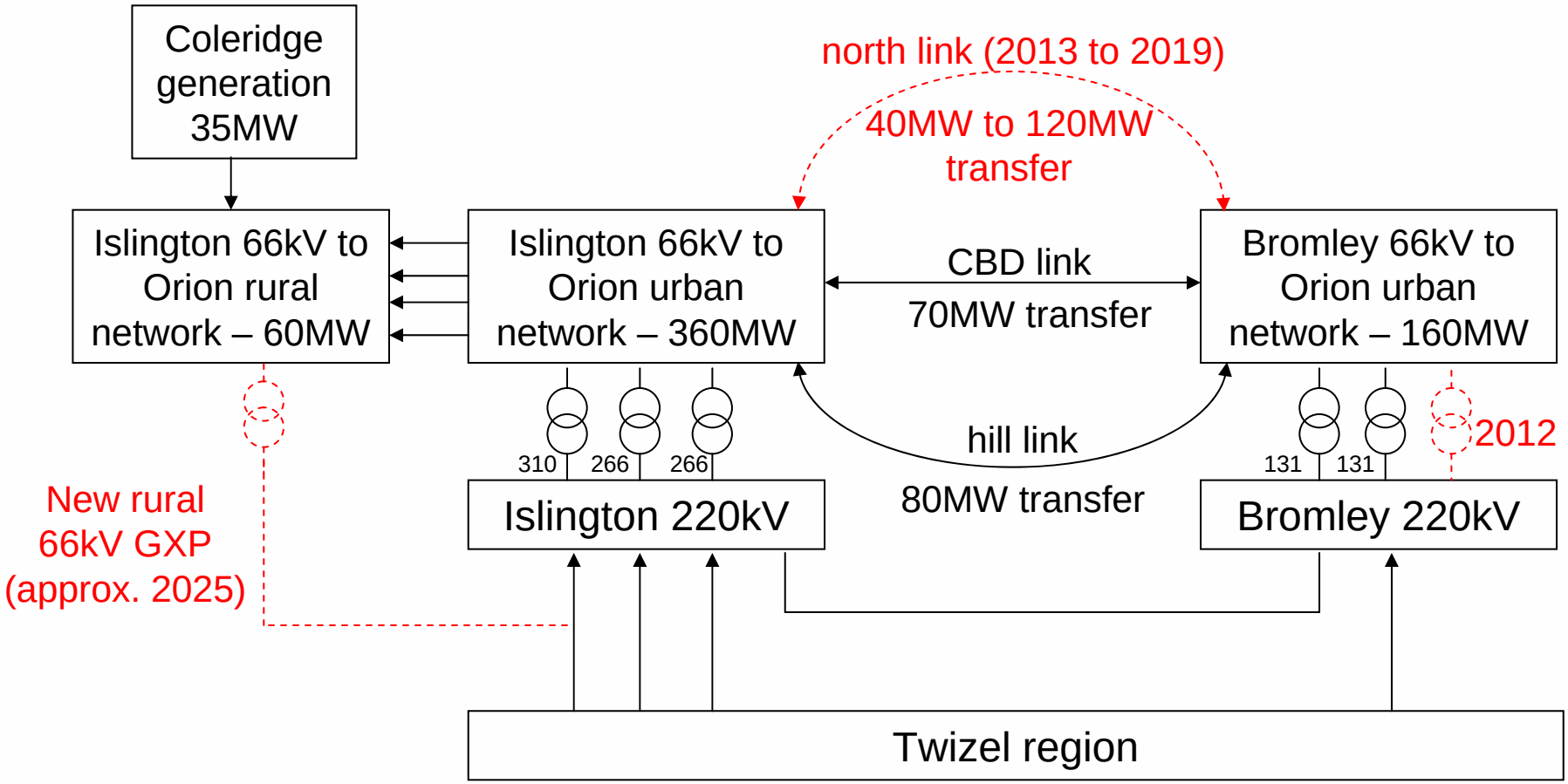


Resilience

- Company culture of **Emergency preparedness**
  - *We are judged by these events!!*

- We use the **4R's** to manage our network risk
  - **Reduction**
    - » Identifying & analysing risks, developing plans & systems to reduce these risks
  - **Readiness**
    - » Developing & exercising operational contingency plans
  - **Response**
    - » Immediate actions during or directly after an emergency event – can be short term repairs to restore power
  - **Recovery**
    - » Permanent repairs to meet our network standards

Reduction – Interconnection of Transpower sites reduces our risk



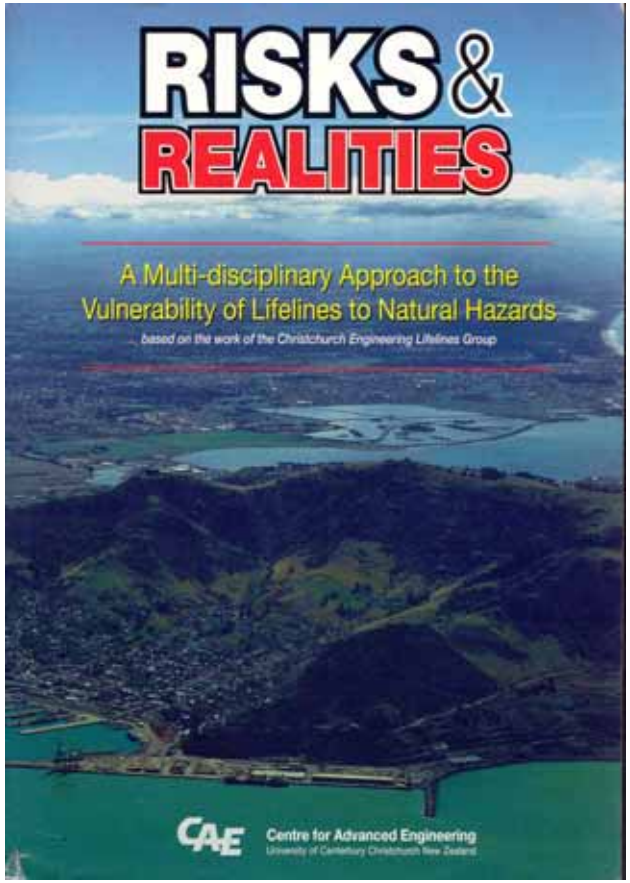
Key risk: ***Almost all supply is derived Sth of Christchurch***

Reduction - natural hazards

- Orion was party to the development of risks & realities in the early 1990's

- Key risks:
  - Seismic
  - Tsunami
  - Snow/wind
  - Flooding

- Key actions
  - $13m spent on CBD security improvement
  - Strengthened power supply to Christchurch Airport, Lyttelton Port & communication sites
  - $5m spent on earthquake strengthening - substations, lines & cables



Reduction natural hazard risk

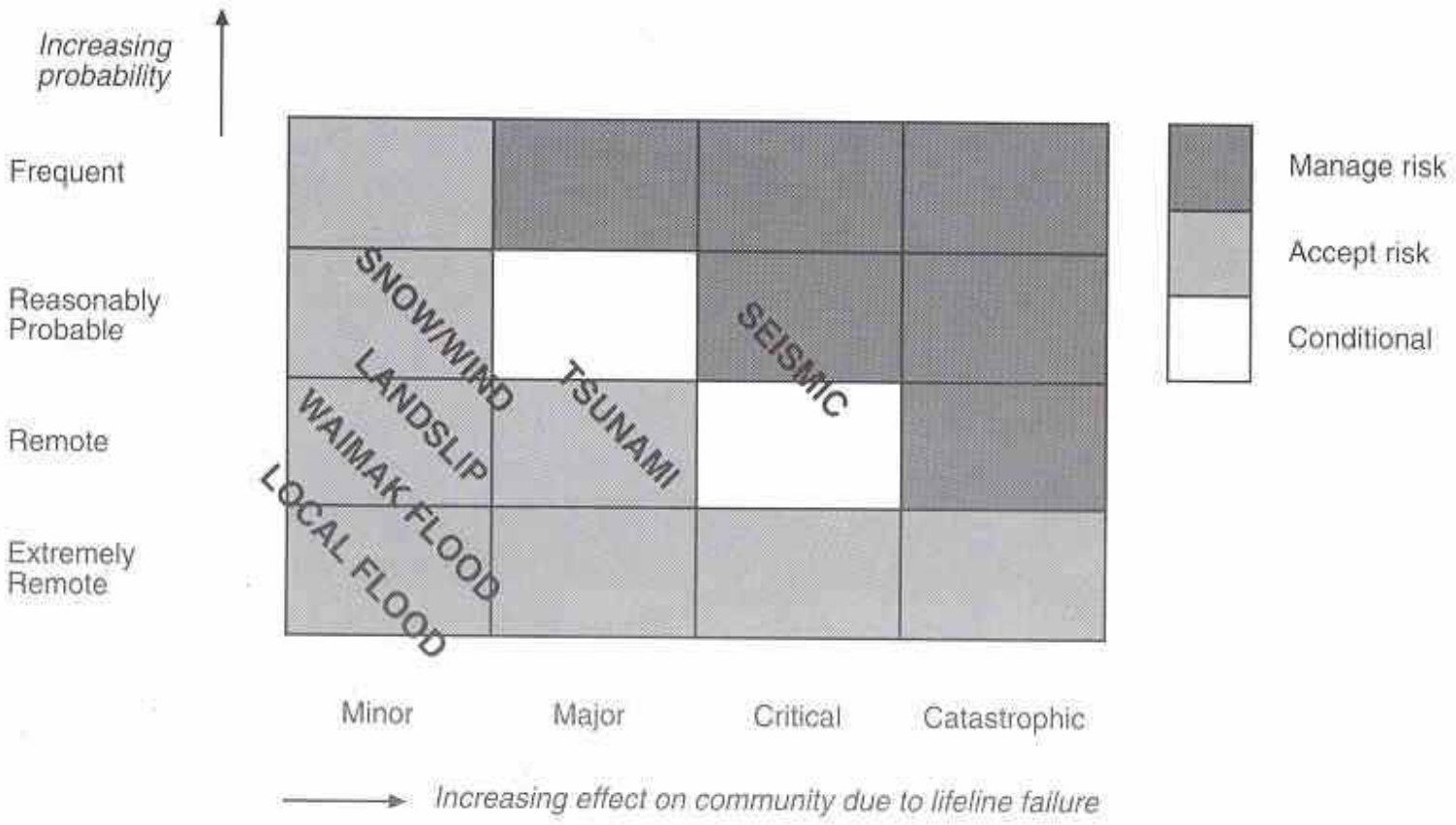
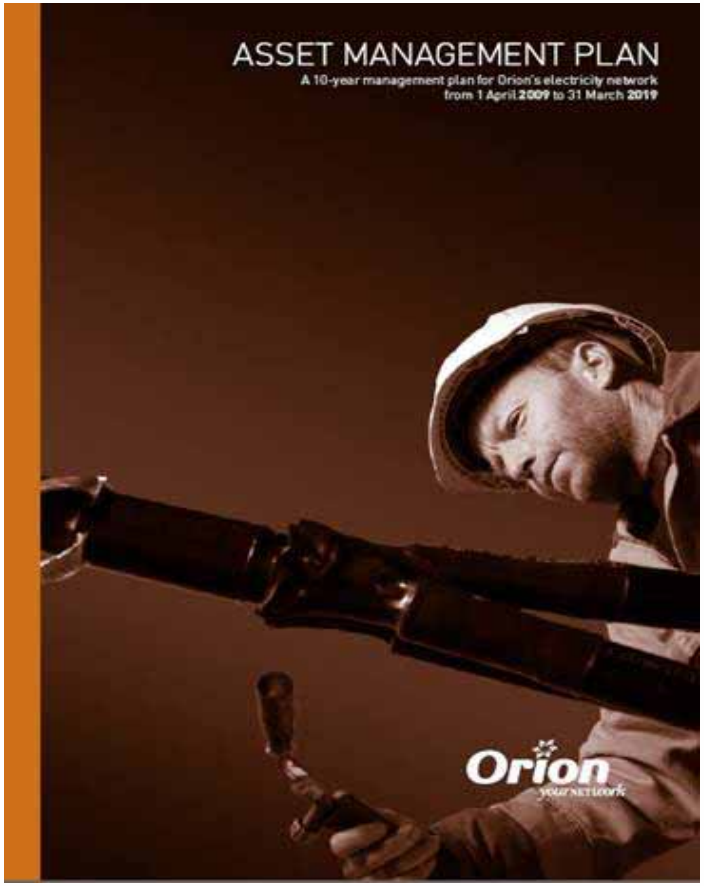


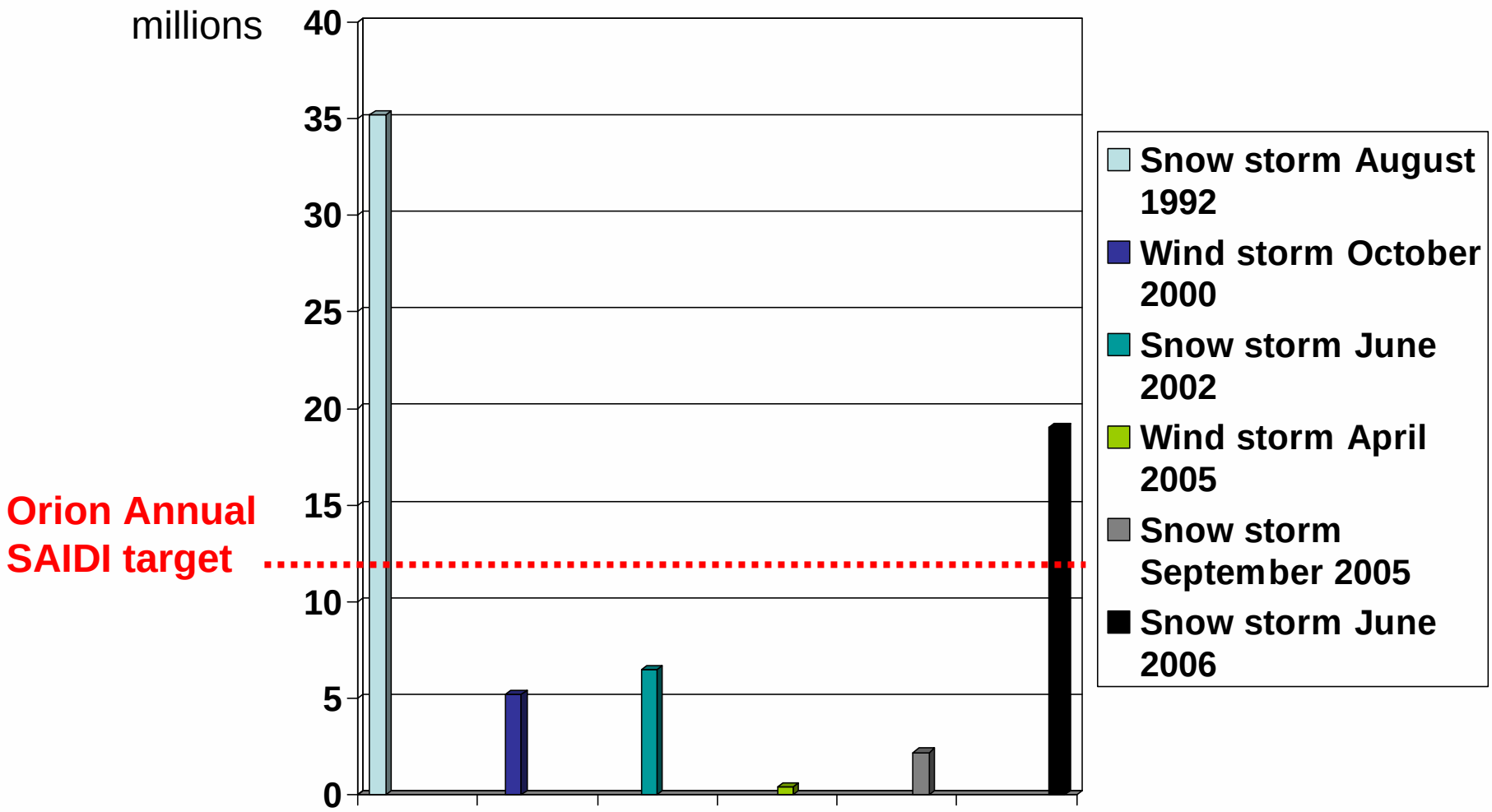
Figure 1.4 : Acceptability of lifelines hazards risk

Reduction - AMP – risk section

- Risk management is Integral part of our Asset management planning
- This ensures that our key risks are managed and budgeted for
- Updated annually
- Used as a working document



Significant events: past 20 years



Reduction – construction review

- Network design review
  - close to optimum
  - some minor strengthening justified
- On average snow storms:
  - affect twice as many customers as wind
  - take 50% longer to restore power
  - result in three times customer minutes lost compared to wind

Reduction - substation seismic risk

- Risk based priorities
  - District substations (urban approx 6,000 customers)
  - Building substations (approx 300 customers)
  - Distribution substations (average 30 customers)

Reduction – building resilience

(Qualitative visual damage evaluation measure: MM scale)

Substation Improvement

V Felt outdoors. Small unstable objects displaced. Hanging pictures move.

VI Felt by all. Windows, crockery broken. Pictures off walls.

VII Difficult to stand. Weak chimneys broken at roof line. Fall of loose bricks, stones and tiles.

VIII Damage to ordinary masonry, partial collapse. Fall of chimneys, factory stacks, monuments, towers etc. Frame houses move on foundations if not bolted down.

IX General damage to foundations. Underground pipes broken. Liquefaction in areas of sand and mud.

X Most masonry and frame structures destroyed. Serious damage to dams.

Reduction – substation seismic risk

- District Substations (50)
  - bund & secure major transformers & coolers, cables & oil tanks

- Network Substations (268)
  - A generic strengthening system was developed to reduce the risk of substation damage

Reduction - pole substation seismic risk

- Pole Substations (5000)
  - About 50% of dual pole substations could be converted to a more secure single pole
  - Adding strength to existing seven iron pole subs by the addition of a part pole

Reduction – major cables seismic risk

- Oil filled cables
  - Review strength of cables near bridge approaches & upgrade

Reduction - foundation repairs to existing poles

Soil removed and replaced with clay stabilised (SAP40) material compacted in 150mm layers

Reduction – port, airport

- Resource access
  - Spares
  - Labour
  - Plant

Lyttelton Port

Christchurch International Airport

Reduction - key communication sites

- **Sugarloaf**
  - Supplied from city side 66kV network
  - Has emergency standby
  - Currently being cabled
  - Key risk snow/wind
- **Marleys Hill**
  - Supplied from Peninsula side rural 33kV network
  - Key risk: Snow/wind, access & trees
  - Cabled hilltop to minimise these risks

Reduction progress: key assets

Asset	Seismic std achieved %
Major cables (66kV & 33kV)	100%
Switchyards	48%
District/zone substations	100%
Network substations	99%
Distribution substations	99%
Dual pole substations	76%
Single pole substations	65%

Readiness

- Centralised Call Centre
- Secure operational Control Centre in place & exercised
  - Backed up by hot standby site
- Security Standard introduced
- System spares & storage contract in place & managed
- Operational assessment staff able to double normal size by utilising engineering staff
- Emergency contractors
  (35-minute response)
- Major emergency contractors
  (4-hour response)
- Mutual aid arrangements in place
  (response as necessary)

Readiness - system spares

- Managed by contract
- Minimum levels set
  - Multiple assets
  - Risk management as basis setting levels
  - Knowledgeable staff
  - Alternative options
- Critical spares
  - Identified
  - Seismic restraint
  - Plan for spares replenishment
    - Contact lists
    - Access via port & airport

Readiness - mutual aid

- Agreement in place
- Simple – agreement in principle
  - Minimum detail
  - Agreement to support each other
  - Identifies contractual principles & responsibilities
  - Agrees on worker safety standards & responsibilities
  - Coordination between CDEM group & other lines companies
  - Provides geographic diversity

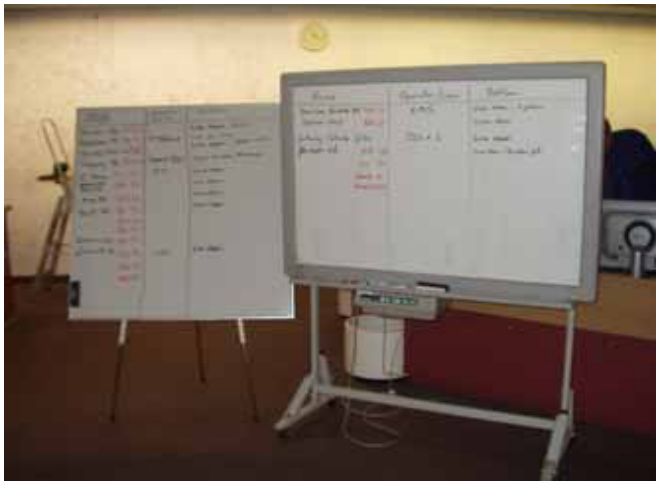
Response – centralised control

- Annual Pandora exercise
- Written Contingency plans established
- Control Centre with generator & back up power supplies established
- A number of large portable generators have been purchased

Response - Control Centre Systems upgrade

- Network Management system currently being installed
- Removal of the paper based wall map & systems
- More automation & control
- More efficient customer response & reporting systems
- Backed up by paper based systems

From this



To this

Recovery

- Design standards established
- Network inspection & action plan to be implemented
- Cancellation of all planned work allows redeployment of resources (accounts for 80 % of our resource pool)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