



# Risk Management and Asset Protection of Wineries

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# Agenda

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## **Section 1**

### Managing the Insurer

- Market Snap-Shot
- Premiums
- What's in it for me?
- What can I pragmatically do?

## **Section 2**

### Seismic

- Insurers' view of seismic risk
- Kaikoura experience
- Market response to recent NZ event
- Pragmatic risk recommendations

## **Section 3**

### Fire

- Exposures
- Examples of Loss
- Pragmatic risk reduction steps

## **Section 4**

### Closing Remarks

## **Appendix A**

### Risk Management Principals

## **Appendix B**

### Other 'simple' fire risk mitigations



## Managing the insurer

- Market Snapshot
- Premiums
- What's in it for me?
- What can I pragmatically do?

# New Zealand Market Snapshot

## All Perils

Year-End	2013	2014	2015	2016	2017
Gross Written Premium	\$4,700,148,673	\$5,258,213,477	\$5,260,803,452	\$5,345,220,23	\$5,727,157,999
Net Written Premium	\$3,652,556,360	\$4,018,404,458	\$3,880,463,935	\$3,425,022,923	\$3,975,655,149
Net Earned Premium	\$3,506,529,351	\$3,912,441,162	\$3,895,768,305	\$3,366,482,641	\$3,784,224,340
Claims Incurred	\$2,174,942,392	\$2,350,393,425	\$2,546,016,620	\$1,968,592,517	\$2,710,849,427
Loss Ratio	62.03%	60.07%	65.35%	58.48%	71.64%
Business Costs (Staff etc)	\$1,200,746,602	\$1,315,241,975	\$1,367,165,689	\$1,186,539,400	\$1,236,198,791
Combined Ratio	96.27%	93.69%	100.45%	93.72%	104.30%

# New Zealand Market Snapshot

## Earthquake

Year-End	2013	2014	2015	2016	2017
Gross Written Premium	\$608,686,700	\$642,638,358	\$560,528,347	\$513,288,251	\$554,701,233
Net Written Premium	\$221,723,316	\$263,734,316	\$226,368,484	- \$81,596,028	\$177,202,600
Net Earned Premium	\$198,612,059	\$268,276,192	\$261,986,321	- \$73,258,527	\$157,686,791
Claims Incurred	\$228,581,132	\$291,746,108	\$457,937,219	- \$204,420,440	\$363,309,158
Loss Ratio	115.09%	108.75%	174.79%	279.04%	230.40%

# Global Market Snap Shot

## 2017: Costliest year on record for weather disasters

Insurance industry in position to handle high volume of claims payouts



**USD 220 billion**

Economic cost of hurricanes Harvey, Irma, and Maria



Percentage of 2017 global economic damage from Harvey, Irma, and Maria

**USD 80 billion**

Insured cost of hurricanes Harvey, Irma, and Maria



Percentage of 2017 global insurance payouts from Harvey, Irma, and Maria

**USD 600 billion**

Amount of available capital by global reinsurers at the end of Q3 2017; industry well suited to handle the volume of claims payouts in 2017.

**Third warmest year**

on record dating to 1880 for combined land and ocean temperatures



**USD 24 billion**



Second-costliest year on record for insurers with the severe weather peril

**USD 14 billion**



Costliest year on record for insurers with the wildfire peril



of catastrophe losses occurred in the continental United States



of insured catastrophe losses occurred in the continental United States

**31 billion-dollar events**

16 in the United States

**14 billion-dollar insured events**

11 in the United States



Individual events



**1,141+**

Highest casualty disaster of 2017 (Mudslide in Sierra Leone)



## Reinsurance Market Support

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- Canterbury Earthquakes, 2<sup>nd</sup> largest natural catastrophe event for global reinsurance cost US\$28 billion.
- Tohoku insured losses were US\$40 billion, out of the total cost of ~ US\$210 billion.
- New Zealand has a 90%+ commercial earthquake insurance take up.
- Japan and California have much lower take up rates, and higher insurance costs and more restricted availability.
- NZ earthquake catastrophe premiums are ~0.1% of the global premium pool (takes around 35 years to repay the reinsurers).
- Japan has already paid back the reinsurers (in 5 years).

**Reinsurers may not be able to support New Zealand on current easy terms in future.**

## Availability of Capital Globally

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- Historically low bond and interest rates resulted in large amounts of capital flooded into reinsurance markets for better returns.
- Cheap capital has driven catastrophe insurance rates to record lows.
- What if rates rise and another large catastrophe event occurs?
  - The London Lloyds market, an alternative for New Zealand, announced \$US2.6 billion in the 2017 accounting year loss.
  - Today, 10-year US Treasury Yields are close to 2.80.% vs. an average of 2.10% in 2013.

**Available cheap capital to reinsurers may be repriced.**

## What Influences Premiums?

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- Market conditions (recent large losses in and out of the industry, insurers' risk appetite etc.)
- Location of risk (e.g. high vs. low seismicity, flood prone areas etc.)
- Your portfolio (diversity both geographically and risk levels, BCPs etc.)
- Negotiating power (spread of risk across multiple insurers, overseas markets involvement etc.)
- Better understanding of your risk (detailed hazard and risk studies, better asset data etc.)

**You are competing for insurers' attention and their capital with your peers.**

# Managing the Insurer

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## What can I do? What's pragmatic?

- Demonstrate proactive and intense risk management
  - Remember pricing is claim dependent.
- Uncertainty costs. Get professional advice on your risks.
- Loss Limits versus total Insured Value – only buy what you need
- Self insured retention levels (excesses) – Getting bang for your buck
- Business Interruption as important (if not more so) than asset protection
- Stop development in high risk areas

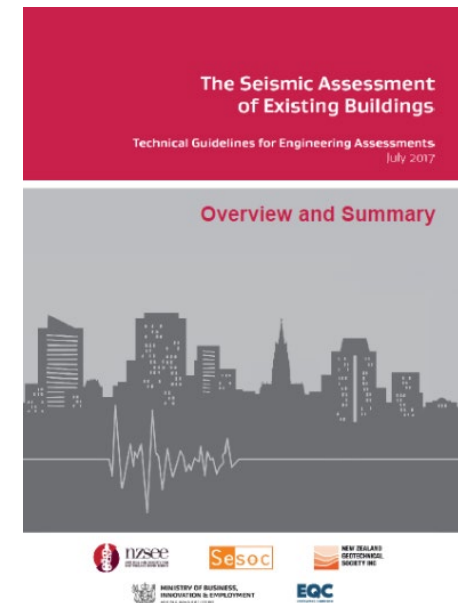


# Seismic

- Insurers' view of risk
- Kaikoura experience
- Market response to the recent events in NZ
- Pragmatic risk mitigation recommendations

# What's on My Insurer's Mind

- New RMS model shows much higher (x 1.4) PMLs for NZ.
- AF8 study shows a regular average return period of ~300 yrs for Alpine Fault over the last 1,000 yrs with the last event ~300 yrs ago.
- %NBS rating is for life safety and does not adequately cover 'damage' and 'downtime'.
  - Extent of loss to Wellington buildings in Kaikoura is concerning (>\$1b).
  - We need better measures (e.g. QuakeStar).
- More scrutiny with new risks in high risk areas (e.g. Wellington) with not much extra capacity for new risks.



# What's on My Insurer's Mind

- Non-compliance of non-structural elements of buildings
  - Up to 40% of the Canterbury losses were from non-structural elements.
- Extended periods of downtime in recent events due to non-compliance of non-structural elements of buildings.
- Soft ground (ground failure related risks e.g. liquefaction and landslides)
- Additional costs associated with removal of Asbestos.



*Building.govt.nz*



*Marlborough DC*

## Kaikoura Experience

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- Kaikoura Earthquake(s) highlighted the importance of seismic resilience of tanks:
  - Wide-spread damage to both legged and flat-bedded tanks in the Kaikoura events.
  - Tanks hold stock that often comprises most of the insured value.
  - In some cases, additional bracing or anchors added post 2013 events, resulted in the anchorage or base frame being stronger than the tank wall, leading to tank wall buckling.
  - Some tanks repairs might be easy and cost-effective. However, in some cases access, dismantling and transport may be challenging and costly.



*Dizhur et al., 2017, NZSEE Bulletin*

## Kaikoura Experience

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- Tanks are not required to be designed by an engineer unlike catwalks!!
- Tanks do not fall under any code (e.g. building code) and so post Kaikoura seismic strengthening work was seen as an “upgrade”, thus not covered by claims.
- Barrel stacks are usually closely spaced with no seismic restraints and no anchorage.
- Localised damage to tanks due to catwalk pounding and damage to catwalk connections was observed.

# Insurance Market Response – More Scrutiny

- Demanding more information to establish your risk profile
- Inspection by an engineer to verify the information supplied or review any areas of concern

Tank Number	Capacity	Age	Manufacturer	Is the Tank Mounted on Legs or Concrete Plinth?	Does it support catwalks?	How are services connected (e.g. flexible or hard connection)?	Detail any damage and repairs from previous EQ event?	Notes and Other Useful Information: <ul style="list-style-type: none"> <li>• For concrete plinth mounted tanks:               <ul style="list-style-type: none"> <li>- Do tank skirts extend to ground.</li> <li>- Is plinth is undersized.</li> <li>- Provide details of tank anchoring systems, e.g. necked bolts, unnecked bolts, internal bolts and seismic anchors such as Onguard or similar.</li> </ul> </li> <li>• For tanks mounted on legs:               <ul style="list-style-type: none"> <li>- Provide details of cross-bracing of legs, anchoring, symmetry of support members, etc.</li> </ul> </li> <li>• Provide details of tanks reviewed by an accredited by a structural engineer.</li> </ul>

Barrel Rack Identifier	Number	Age	Manufacturer	How many levels high is the storage?	What capacity are the barrel racks?	What is the manufacturers recommended storage height?	Where are they stored?	Notes



## Insurance Market Response – Change in Appetite

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### Concrete Plinth Tanks

- There is appetite for:
  - Flat-bedded tanks with a capacity of  $\leq 90,000$  litres if have well-detailed plinth and anchorage.
  - Flat-bedded tanks with a capacity of  $> 90,000$  litres if have been seismically designed to IL2 requirements as per NZS1170.5
- Only limited appetite for:
  - Tanks with capacities  $> 90,000$  litres that have not been designed to IL2.
  - Tanks with inadequately skirt walls or very thin walls
  - Undersized or non-uniform plinths
  - Poorly detailed anchor bolts (both insufficient or excessive in number or inadequate support).

## Insurance Market Response – Change in Appetite

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### Legged Tanks

- There is appetite for:
  - Legged tanks with a capacity  $\leq 20,000$  litres with adequate support base frame and braced legs.
- There is only limited appetite for:
  - Legged tanks with a capacity of  $> 20,000$  litres.
  - Tanks with unbraced legs
  - Tanks with stress concentrations (e.g. narrow legs connecting to wide beam flanges)
  - Inadequate much less substantial adjustable feet that when fail result in leg buckling.

# Insurance Market Response – Change in Appetite

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## Catwalks

- All catwalks and services bridges must be supported independently from tanks and flexible connections should be used to connect tanks to services bridge.

## Barrel racks

- Barrel storage racks should be of 'seismic' type (seismically designed).
- Barrel rack stack heights are limited to a maximum of four racks high.

## Seismic – Pragmatic Seismic Risk Reduction steps

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- Demonstrate proactive and intense risk management
- Be prepared to provide better data on your asset portfolio
- Invest in resilience:
  - Business continuity plans
  - Restraining non-structural elements
  - ISAs/DSAs and investment on strengthening work
  - Avoid development in high risk areas.

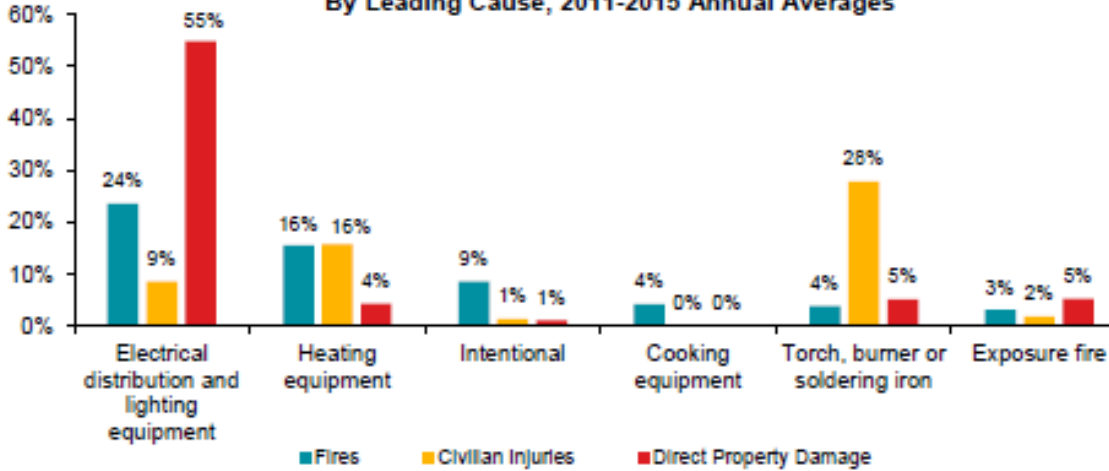


# Fire

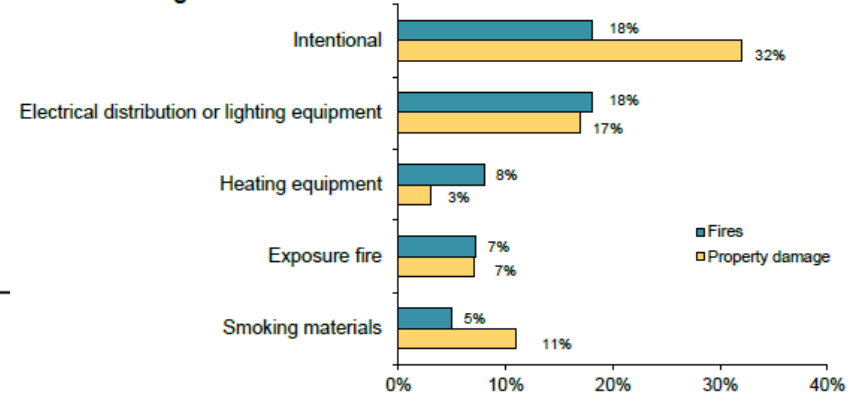
- Exposures
- Examples of Loss
- Pragmatic Risk Reduction steps

# Statistical causes of fire

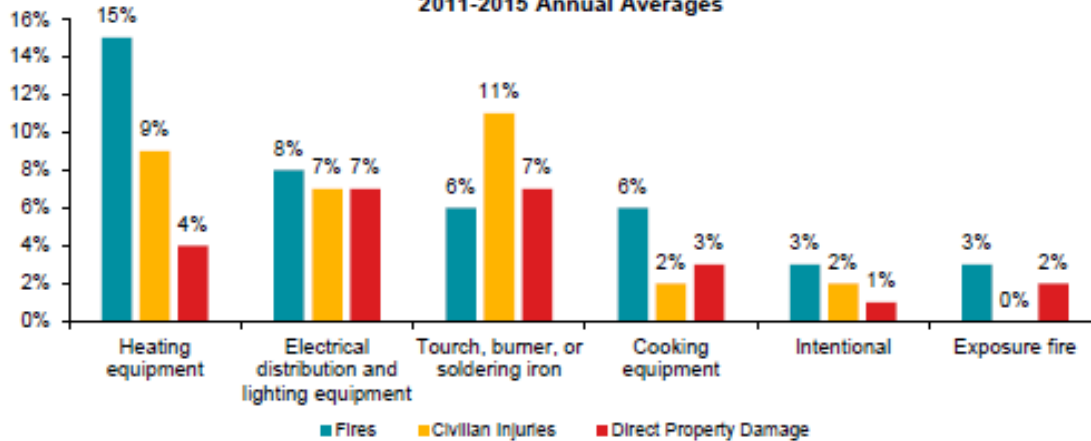
**Figure 5. Structure Fires at Industrial Properties By Leading Cause, 2011-2015 Annual Averages**



**Leading Causes of Warehouse Structure Fires: 2009-2013**



**Figure 7. Structure Fires at Manufacturing Properties By Leading Cause 2011-2015 Annual Averages**



Source: NFPA 2018 Fires in Warehouse properties 2016

Source: NFPA 2018 Fires in Industrial and Manufacturing properties 2018

# Statistical causes of fire

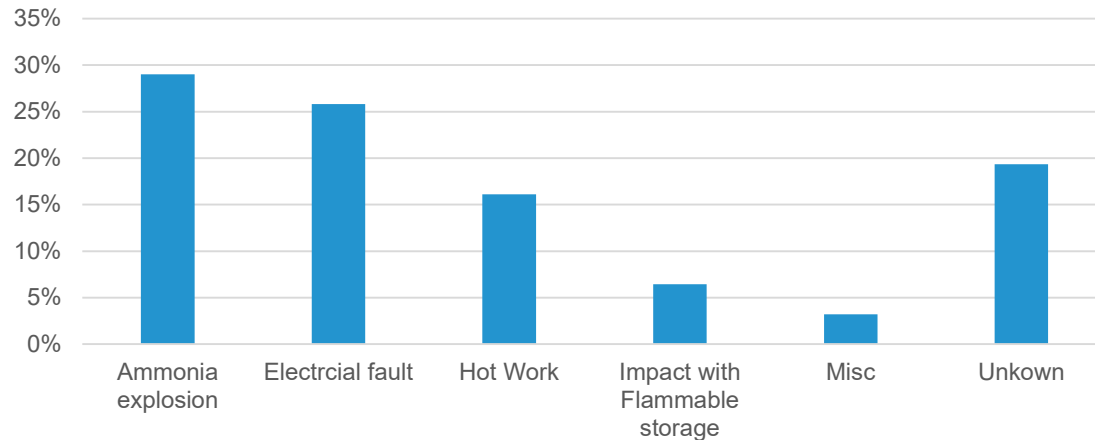
- (a) Arson;
- (b) Poor Electrical Installation;
- (c) Hot Working and Welding;
- (d) Hot Cooking Processes and Associated Ductwork;
- (e) Deep Fat Continuous Fryers;
- (f) Ductwork Flues and Filters;
- (g) Refrigerator Defrost Systems;
- (h) Process Gases;
- (i) Rubbish stored against Walls; and
- (j) Battery Charging Areas.

FIRE CAUSE	FIRES (PER CENT)		
	New Zealand Freezing Companies Association Records 1952-72 (Hunt, 1982)	International Records (IIR, 1987)	New Zealand Records (Nelligan, 2006)
Hot work (welding, gas cutting etc.)	56	34	*31
Electrical	15	30	38
Arson		6	*(could include arson)
Solid fuel heating equipment		(not included)	19 (for all panel buildings)
Chemical		4	
Ammonia		2	
Other causes	15	9	4
Unknown	15	16	8

Source: Insulated Panel Council of Australasia COP 2014

Source: IPENZ 2009 Coldstore Engineering in New Zealand

## North American Cold Storage Fires (1975-2005)



Source: NFPA 2011 Selected Published Incidents Involving Cold Storage Facilities

# Fire

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## Fire Exposures to your site

Leading causes of fire:

- Hot Work
- Electrical Fault

Intensifying factors. What makes a fire worse?

- Expanded Polystyrene Sandwich (EPS) panelling
- Ammonia gas
- Idle pallet storage
- Exposed/Impaired sprinkler systems
- Flammable Goods

So What?

*“That would never happen here.....”*

*“We’ve been doing it like that for years.....”*

# Thomas Foods International, Murray Bridge, Australia

## Fire on January 2018

- One of three largest meat processors in Australia
- Processing Plants in Lobethal (SA), Tamworth (NSW) and Murray Bridge (SA)
- Murray Bridge site employed 300 (with 1,400 wider local jobs)
- Fire occurred when a worker was “welding an offal bin”. Subsequently caused a fire within the EPS panelling core, that rapidly spread.
- Fire damaged Boning Room and Storage, including \$30 million in upgrades finished in 2015
- TFI stated “It is one of the single biggest claims of insurance outside mining for over a decade”
- Total claim ~\$500M. Total actual loss ~\$600-700M



Image source: [www.news.com.au](http://www.news.com.au)

# Swickers, Kingaroy, Australia

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## Fire on November 2016

- Single Processing Plant (Qld)
- Southern Hemispheres largest pork processing plant
- Kingaroy site employed 600
- Fire occurred due to fault with lighting at the start of shift. Subsequently caused a fire within the EPS panelling core, that rapidly spread.
- Fire damaged Boning Room and Chilled Storage, and Distribution Centre



Image source: [www.southburnettimes.com.au](http://www.southburnettimes.com.au)

## Fire – Pragmatic Fire Risk Reduction steps

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Insurers are adverse to Expanded Polystyrene Sandwich (EPS) panels.

Nearly all will insist on sprinklers. In current market conditions, this does not reduce premiums, but is needed as a basis to just get insurance.

## Fire – Pragmatic Fire Risk Reduction steps

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### Treating: Expanded Polystyrene Sandwich Panels

- Alternative panelling material
  - Reduces: Consequence
  - Hierarchy control: Elimination
  - Cost-Benefit:
    - Low (for existing buildings)
    - High (for new/planned buildings or for general replacement)

Material	Thermal Conductivity	Fire Performance <sup>1</sup>
Expanded Polystyrene (EPS)	0.033 W / m °C	“Unacceptable” - re-ignition after inception risk extinguished and reach a peak greater than 400kW
Polyurethane (PUR)	0.025 W / m °C	“Not recommended” - peak higher than 1500kW at any exposure
Polyisocyanurate (PIR)	0.023 W / m °C	“Good performance” - peak heat release less than 800kW at any exposure level
Modified Phenolic	0.035 W / m °C	“Excellent performance” - total heat release less than 100MJ
Mineral Wool	0.040 W / m °C	“Excellent performance” - total heat release less than 100MJ

<sup>1</sup>Building Research Establishment Ltd, 2001 based upon the LPS1181 test

## Fire – Pragmatic Fire Risk Reduction steps

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### Treating: Expanded Polystyrene Sandwich Panels

- Alternative panelling material
  - Third party test certifications to look out for:



- Examples of commercial products or companies that provide third party approved products:



## Fire – Pragmatic Fire Risk Reduction steps

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### Treating: Expanded Polystyrene Sandwich Panels

- Installing fire sprinklers
  - Installing sprinklers to NZS4541 standards
    - Reduces: Consequence
    - Hierarchy control: Engineering Control
    - Cost-Benefit: Low (for existing buildings); moderate to high (for new/planned buildings)
  
- Expanding an already present fire sprinkler system
  - Expanding current installation, to NZS4541 standards
    - Reduces: Consequence
    - Hierarchy control: Engineering Control
    - Cost-Benefit: Low to High
  
- How else to manage EPS besides Sprinklers and PIR panelling?

# Fire – Pragmatic Fire Risk Reduction steps

## Managing existing panel

Action	Reduces	Risk Control	Cost-Benefit
Penetrations into/through panel <ul style="list-style-type: none"> <li>Panel penetrations fitted with sleeve</li> <li>Panel penetrations sealed up</li> </ul>	Likelihood	Engineering	High
Exposed core <ul style="list-style-type: none"> <li>Prompt reporting and repairing of damage to EPS panels</li> <li>Weekly/month walk arounds identifying and repairing damage to EPS panels</li> </ul>	Likelihood	Administrative	High
Impact <ul style="list-style-type: none"> <li>Installing impact protection around high traffic areas</li> <li>Exclusion zone around walls</li> </ul>	Likelihood	Engineering	Moderate
Fire compartmentalisation <ul style="list-style-type: none"> <li>Installing fire walls, fire parapets, automatic closing fire doors, etc.</li> </ul>	Consequence	Isolate	Low to High
Permit to Work system <ul style="list-style-type: none"> <li>Using a Hot Work, Cold Work or dedicated EPS permit to control fire ignition sources</li> </ul>	Likelihood	Administrative	High

## Fire – Pragmatic Fire Risk Reduction steps

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However EPS does not increase the likelihood of a fire. It increases the likelihood of a “big” fire.

Some other impactful things to do to control fire risk...


## Fire – Pragmatic Fire Risk Reduction steps

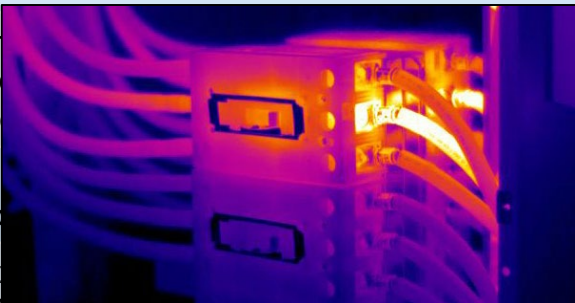
### Treating: Electrical Faults

Action	Reduces	Risk Control	Cost-Benefit
Fire cells <ul style="list-style-type: none"> <li>• Creating dedicated fire rated enclosures for main electrical plant</li> <li>• Ensuring integrity of fire cell.</li> </ul>	Consequence	Isolate	Good
Maintenance <ul style="list-style-type: none"> <li>• Predictive Maintenance               <ul style="list-style-type: none"> <li>• Annual Thermography</li> <li>• Transformer Dissolved Gas Analysis (DGA) and fluid screening test</li> </ul> </li> <li>• Preventative Maintenance</li> </ul>	Likelihood	Engineering	Good
Forklift charging areas <ul style="list-style-type: none"> <li>• Separation from poly-panel (preferably a separate building)</li> <li>• Good ventilation</li> <li>• Impact protection</li> <li>• Elevated from floor</li> <li>• Clear of combustibles</li> <li>• Preventative Maintenance</li> </ul>	Consequence & Likelihood	Isolate & Engineering	Moderate
Smoke detection <ul style="list-style-type: none"> <li>• Monitored smoke detection in electrical plant room and above large/critical plant</li> </ul>	Consequence	Engineering	Moderate to Good
Housekeeping <ul style="list-style-type: none"> <li>• Clearance around plant (1m around switchboards)</li> </ul>	Consequence	Isolate	Good
Low energy lighting <ul style="list-style-type: none"> <li>• Replace HID for Light Emitting Diode (LED) lighting</li> </ul>	Likelihood	Eliminate	Good

# Fire – Pragmatic Fire Risk Reduction steps

## Treating: Electrical Faults

Action	Reduces	Risk Control	Cost-Benefit
<p>Fire cells</p> <ul style="list-style-type: none"> <li>• Creating</li> <li>• Ensuring</li> </ul>	Consequence		
<p>Maintenance</p> <ul style="list-style-type: none"> <li>• Predictive</li> <li>• Annual</li> <li>• Tri-annual</li> <li>• Preventive</li> </ul>	Likelihood		
<p>Forklift charging</p> <ul style="list-style-type: none"> <li>• Separation from poly panels (preferably a separate building)</li> <li>• Good ventilation</li> <li>• Impact protection</li> <li>• Elevated from floor</li> <li>• Clear of combustibles</li> <li>• Preventative Maintenance</li> </ul>	Consequence & Likelihood		
<p>Smoke detection</p> <ul style="list-style-type: none"> <li>• Monitored smoke</li> <li>• Large/critical point</li> </ul>			Moderate to Good
<p>Housekeeping</p> <ul style="list-style-type: none"> <li>• Clearance around</li> </ul>			Good
<p>Low energy lighting</p> <ul style="list-style-type: none"> <li>• Replace HID for Light Emitting Diode (LED) lighting</li> </ul>			Good



# Fire – Pragmatic Fire Risk Reduction steps

## Treating: Hot Work

Action	Reduces	Risk Control	Cost-Benefit
Dedicated HW Bays <ul style="list-style-type: none"> <li>• With non-combustible construction / screens</li> <li>• Separation from EPS panel</li> <li>• Ventilation / extraction of sparks to a safe place</li> <li>• Clear of flammables and general combustibles</li> <li>• On hand fire fighting equipment</li> </ul>	Likelihood	Eliminate & Isolate	Good
Hot Work Permit practices and system <ul style="list-style-type: none"> <li>• NFPA 51B:2014 Fire prevention during welding, cutting and other hot work</li> <li>• FM Global Property Loss Prevention Data Sheet 10-3:2016 Hot Work Management</li> </ul>	Likelihood	Administrative	Good





# Closing Remarks

# Closing Remarks

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## What's the problem?

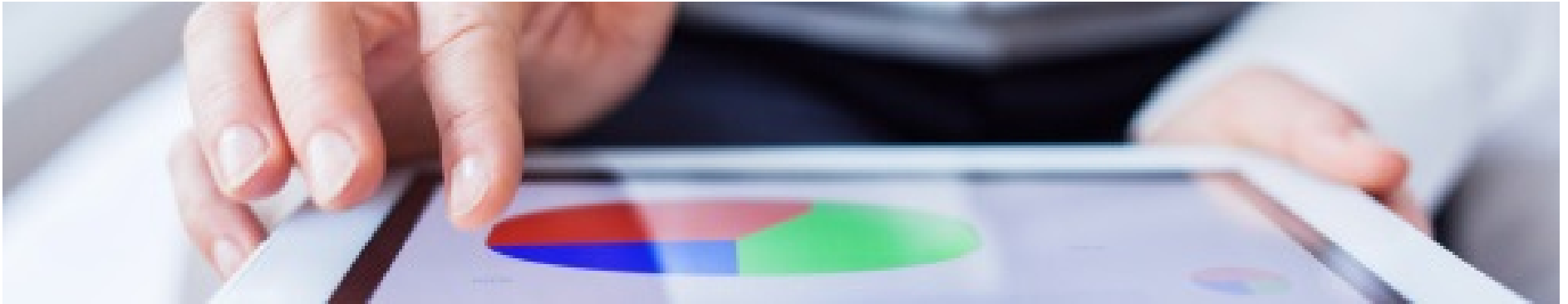
- Leading losses are Fire and Seismic
  - Majority of New Zealand Wineries are located in seismically active areas
  - Underwriters looking to exclude EPS risks from their portfolio.
- Insurers are risk adverse

## What can I do?

- Proactive and pragmatic risk management, demonstrates you're a "good" risk
  - Fire Risk Management controls
  - Invest on seismic strengthening.
  - Business Continuity Management in case of site outage

## What's the benefit of this? What's in it for me?

- Helps to manage the insurer (insurance availability and hopefully lower premium rates)
- Minimises material damage
- Minimises business interruption
- No or better claims history also means higher chance of securing capacity and better rates



## Appendix A - Risk Management Principals

- Contextualise, Identify, Analyse, Evaluate, Treat
- Risk Matrix, Control Hierarchy, and Cost-Benefit

# Risk Management Principals

## Risk Management Process

- Familiar and recognisable process
- Replicated in other areas (e.g. OHS)
- Based on the five steps:
  - Contextualise
  - Identify
  - Analyse
  - Evaluate
  - Treat

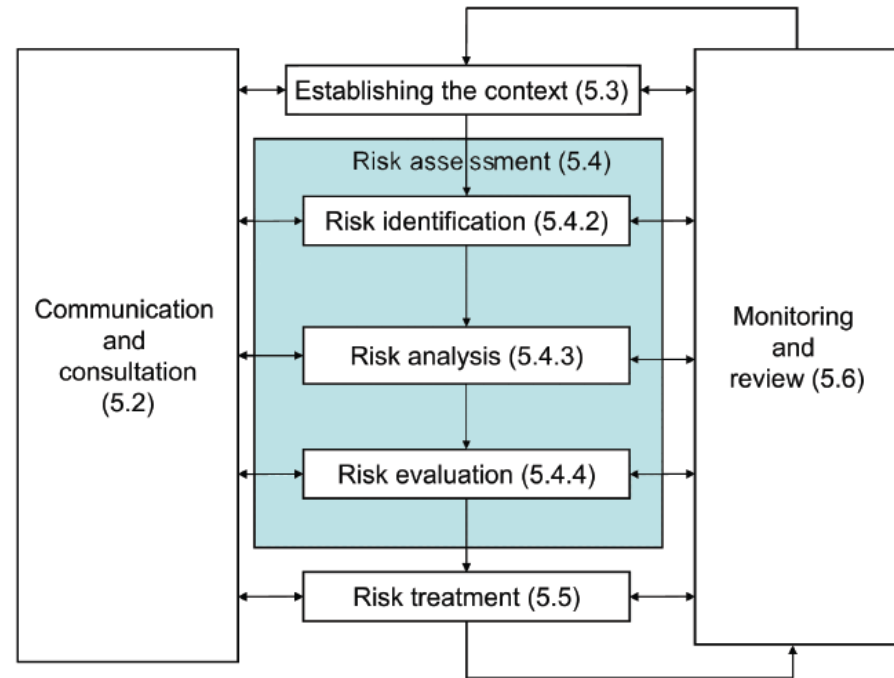


Image source: AS-NZS31000:2009

# Risk Management Principals

## Identify and analyse

LIKELIHOOD	CONSEQUENCE				
	None/Negligible	Low	Moderate	High	Very High
Very High	Moderate	High	High	Very High	Very High
High	Moderate	Moderate	High	Very High	Very High
Moderate	Low	Moderate	Moderate	High	Very High
Low	Low	Low	Moderate	High	High
None/Negligible	Low	Low	Low	Moderate	High

Image source: AS-NZS3100:2009

## Evaluate and Treat

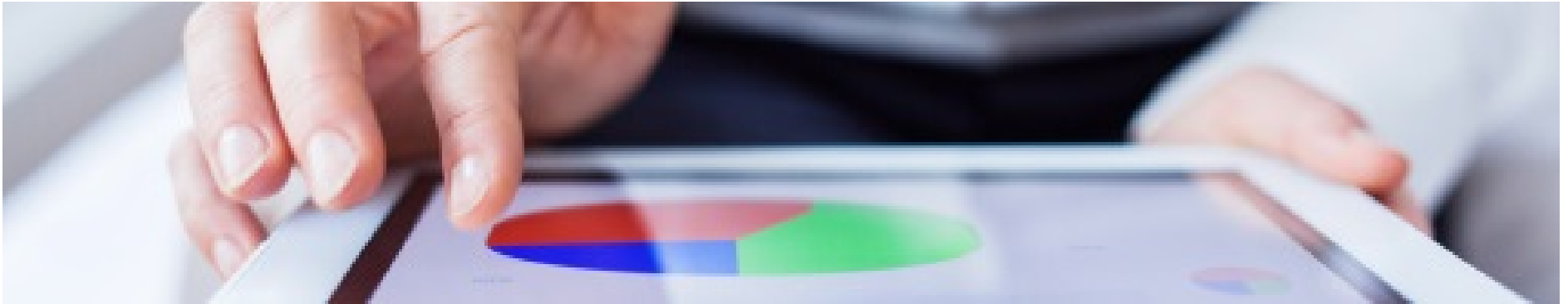
### Control Hierarchy

Elimination
Substitution
Isolation
Minimization
Eng. Control
Admin. Control
PPE

Image source: AS-NZS3100:2009

Cost of Control	Control Effectiveness			
	Low	Moderate	High	Very High
Low	Poor	Moderate	Good	Good
Moderate	Poor	Moderate	Good	Good
High	Poor	Moderate	Moderate	Moderate
Very High	Poor	Poor	Poor	Poor

Image source: Aon New Zealand



## Appendix B – Other ‘simple’ fire risk mitigations

- Flammable and combustible goods
- Sprinkler protection
- Ammonia refrigerant gas

# Fire – Pragmatic Fire Risk Reduction steps

## Treating: Flammable (Class 3) and Combustible (idle pallet) goods

Action	Reduces	Risk Control	Cost-Benefit
<b>Pallet Storage management</b> <ul style="list-style-type: none"> <li>• Fire rated or 10m physical separation from sprinklered and/or EPS buildings</li> <li>• “Do not store above this height” signs in sprinklered buildings</li> </ul>	Consequence	Isolate & Minimise	Good
<b>Storage and handling areas</b> <ul style="list-style-type: none"> <li>• Impact protection (bollards, guards, barriers, etc.)</li> <li>• Securing compressed gas bottles</li> <li>• Grounding/Earthing</li> <li>• Dedicated fire cells, and/or:                             <ul style="list-style-type: none"> <li>• Fire rated or 10m physical separation from buildings                                     <ul style="list-style-type: none"> <li>• Fire rated or 3m physical separation from Class 5 substances (oxidisers)</li> </ul> </li> </ul> </li> </ul>	Consequence	Isolate	Good



# Fire – Pragmatic Fire Risk Reduction steps

## Treating: Impaired/exposed sprinkler systems

Action	Reduces	Risk Control	Cost-Benefit
Sprinkler code compliance <ul style="list-style-type: none"> <li>• (Fire Service) Contractor quality controls</li> <li>• Site engineer walk arounds</li> <li>• Biennial flow testing and inspection to NZS4541</li> </ul>	Consequence	Engineering & Administrative	Good
Fire systems impairment system <ul style="list-style-type: none"> <li>• Use of an Impairment Notification system (aligned to the permit to work system)</li> <li>• Checks for; area impaired, non-standard activities carried out in impaired area, hazards in the impaired area, additional precautions taken, length of impairment (&lt;1 shift, or &gt;1 shift)</li> </ul>	Consequence & Likelihood	Administrative	Good



# Fire – Pragmatic Fire Risk Reduction steps

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Ammonia....

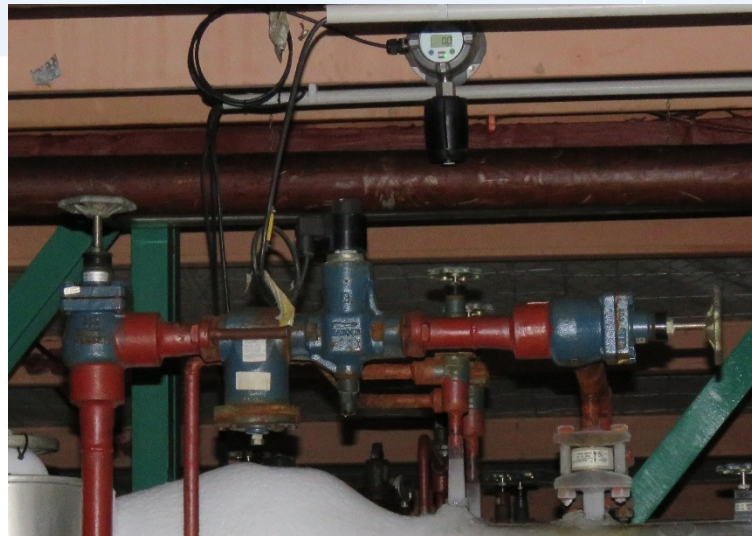
- Red flag for insurers
- Inherently explosion hazard (albeit under specific conditions)
- History of explosions (particularly in the USA until the early 90s)
- Likely a bigger H&S hazard to site, than a fire/explosion hazard

Some easy things to do....

# Fire – Pragmatic Fire Risk Reduction steps

## Treating: Impaired/exposed sprinkler systems

Action	Reduces	Risk Control	Cost-Benefit
Ammonia leaks <ul style="list-style-type: none"> <li>Preventative Maintenance</li> <li>Monitored leak detection in engine rooms, roof spaces, etc.</li> <li>Automatic Isolation valves</li> <li>Ventilation of engine rooms, roof spaces, etc.</li> </ul>	Consequence & Likelihood	Engineering	Moderate to Good
Emergency Preparedness <ul style="list-style-type: none"> <li>Crisis Management, PPE equipment, ERT training, Fire brigade familiarisation, etc</li> </ul>	Consequence & Likelihood	Administrative	Moderate to Good



# Biographies

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**Chris Standing** | Risk Engineer

Chris has 10 years' experience as a Chemical and Process Engineer working internationally, often on location, for over 30 different clients with extensive experience in the Oil & Gas, Energy, and Food & Beverage sectors.

Three years ago Chris joined Aon New Zealand as an Industrial Risk Engineer specializing in Fire Protection, Manufacturing Resilience and Process Safety. His role with Aon is two-fold:

1. Providing clients with site risk assessment for insurance underwriting purposes,
2. Risk reduction exercises including: bespoke Fire Engineering, QRA, HAZOP, FMEA, Bowties, Cost-Benefit analysis, etc.

Clients with Aon include: Food & Beverage, Water & Wastewater, Rail, Telecommunications, Mining, Construction, Chemical, Pulp & Paper, Timber, Storage & Distribution, Television, and Commercial buildings.

Chris is a Chartered Engineer, Chartered Scientist, Six Sigma Green Belt and authored multiple patents, publications and Material Safety Data Sheets.



**Dr Mostafa Nayerloo** | Senior Risk Consultant

Mostafa has more than 15 years' engineering experience with the last 7 years specialising in providing natural hazards risk engineering and consultancy services to a wide range of clients including local authorities and central government. Dr Nayerloo's extensive experience and deep understanding of both deterministic (scenario-based) and probabilistic modelling approaches for material damage and business interruption loss modelling are essential in setting insurance cover limits for clients. Mostafa has undertaken publicly funded research in collaboration with New Zealand and overseas universities and research centres to better understand New Zealand's built environment and risks imposed upon it by the nature, and to transform this knowledge into economic, environmental and social benefits for New Zealand. He has had major contribution to numerous research papers and technical reports.

# Contact List

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**Aon** is the leading provider of insurance broking, risk management and associated services, both in New Zealand and globally.

### **Aon Global Risk Consulting**

Our Global Risk Consulting (AGRC) division is a global service delivered locally in New Zealand by a highly qualified and experienced team who provide a range of integrated solutions to help clients understand and improve their risk profile, protect their interests and increase their business profitability.

**These solutions** encompass:

- Fire Protection
- Risk Engineering and Consultancy
- Risk Accounting
- Valuation Services.

**Our priority** is to understand your business and your people so we can add distinctive, long-term value through the work we do. We promise to be outstanding partners, offer expertise, design innovative solutions, deliver with excellence, and produce results. And you can hold us to that.

### **The Aon Client Promise**

All of our Risk Engineering and Consultancy assignments are undertaken according to our service methodology, The Aon Client Promise. This method provides a service framework against which our clients can measure the key outcomes of our service delivery throughout each phase of the project.

Through broad access – both locally and globally – to an expansive network of resources, markets and underwriting capital and capability, we offer outstanding subject matter expertise, pragmatic solutions and measurable results.

**The Aon Client Promise** is about listening and responding – to exceed client expectations and provide customised advice.