



Ausgrid

Implementation and monitoring of effective of asset management strategies

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Agenda

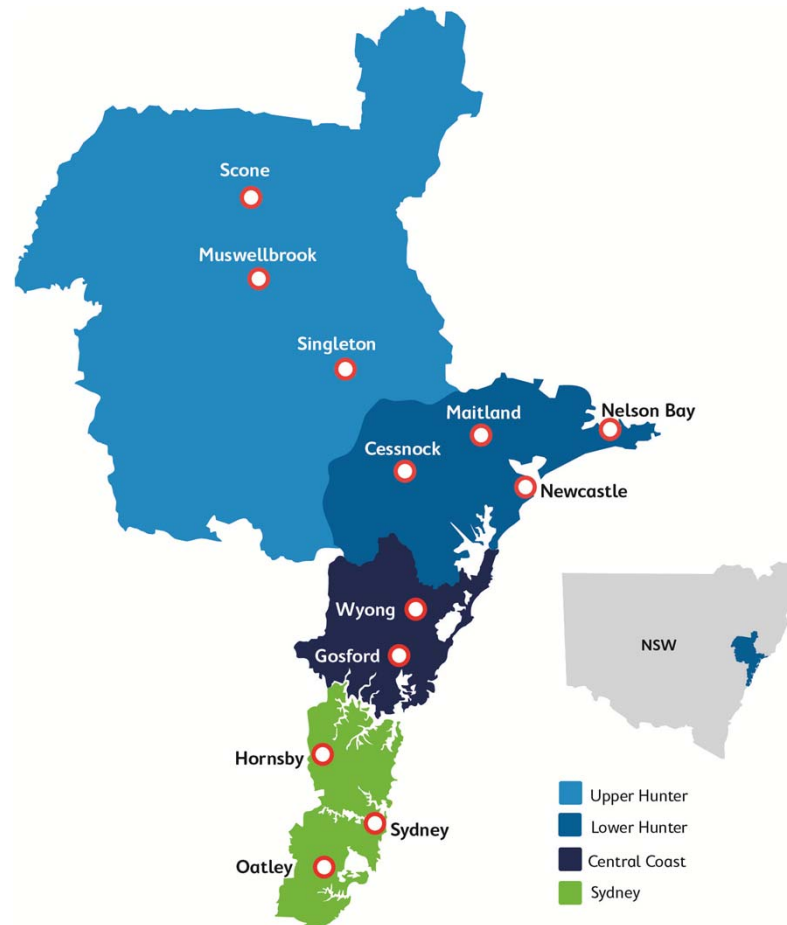
1. Ausgrid Overview
2. What does the board want/need from Asset Management?
3. How do we answer these questions?
4. Asset Management Maturity Model
5. Closing

About Ausgrid



About Ausgrid

- Operating for over 100 years
- Operating area of 22,275 km sq
- Supplied more than 32,000 GWh of electricity in 2008/09
- 1.6 million network customers



Ausgrid's Network Area

- Over 1.4 million retail customers
- 5,649 full time employees
- Lost time injury frequency rate 3.6
- Total revenue A\$3.3bn
- Total assets A\$35.9bn
- EBIT A\$596m

Ausgrid Assets Include

- More than 550 large transformers
- Approximately 8000km high voltage underground cable
- More than 13,500km high voltage overhead cable
- Approximately 1,500 high voltage circuit breakers
- Many 1,000s of lower voltage assets...
- Over \$35.2 billion worth of assets

What does the Board need from Asset Management?

1. What is the value of assets owned by the business?
2. Will the current levels of investment result in sustainable delivery of outputs?
3. Will the current level of investment result in required asset condition?
4. What are the long term impacts of varying CAPEX or OPEX budgets by $\pm 10\%$?
5. What are the top 10 risks associated with assets and what is their financial value for probability of occurring?

How do we answer these questions?



1. What is the value of assets owned by the business?

Need to know the following information on the assets:

- Composition of your asset base
- Age profiles
- Replacement costs
- Depreciation factors
- Network considerations

1. What is the value of assets owned by the business? (Cont'd)

In Ausgrid, we perform **ODRC** analysis:
(**O**ptimised, **D**epreciated **R**eplacement **C**ost analysis)

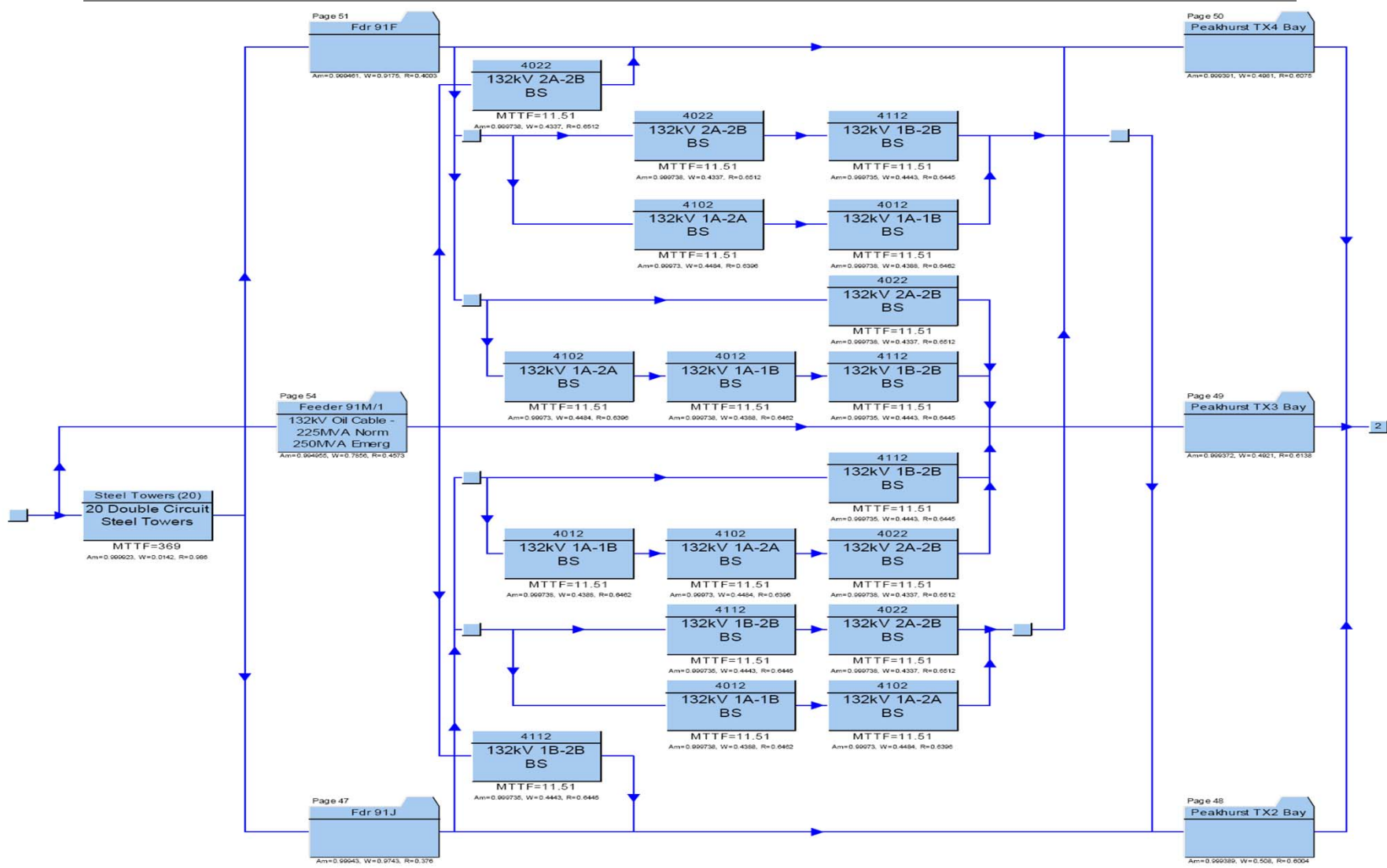
- Establish the replacement cost of assets with a modern equivalent
- Depreciate this cost to reflect remaining effective life of current assets
- Optimise this replacement cost for over-design, over-capacity etc
- Determine a value for the total asset base

2. Will the current levels of investment result in sustainable delivery of outputs?

Need to know the following information:

- Utilisation of assets
- Condition of assets
- Impact of investment on pricing/profit/compliance
- Impact of investment level on staffing requirements
- Impact of investment level on system reliability

2. Will the current levels of investment result in sustainable delivery of outputs? (Cont'd)



3. Will the current level of investment result in required asset condition?

Need information on:

- Maintenance requirements methodology
- Repair/Replace analysis
- Spares requirements methodology
- Condition of assets – ‘health index’
- Projections on required investment to meet needs

3. Will the current level of investment result in required asset condition?

Is your current investment gathering;

- Asset Information
- Costs of:
 - Maintenance
 - Breakdowns
 - Corrective actions
- Are these costs increasing or decreasing
- What is the health of my assets
- What are my future costs expected to be

3. Will the current level of investment result in required asset condition? (Cont'd)

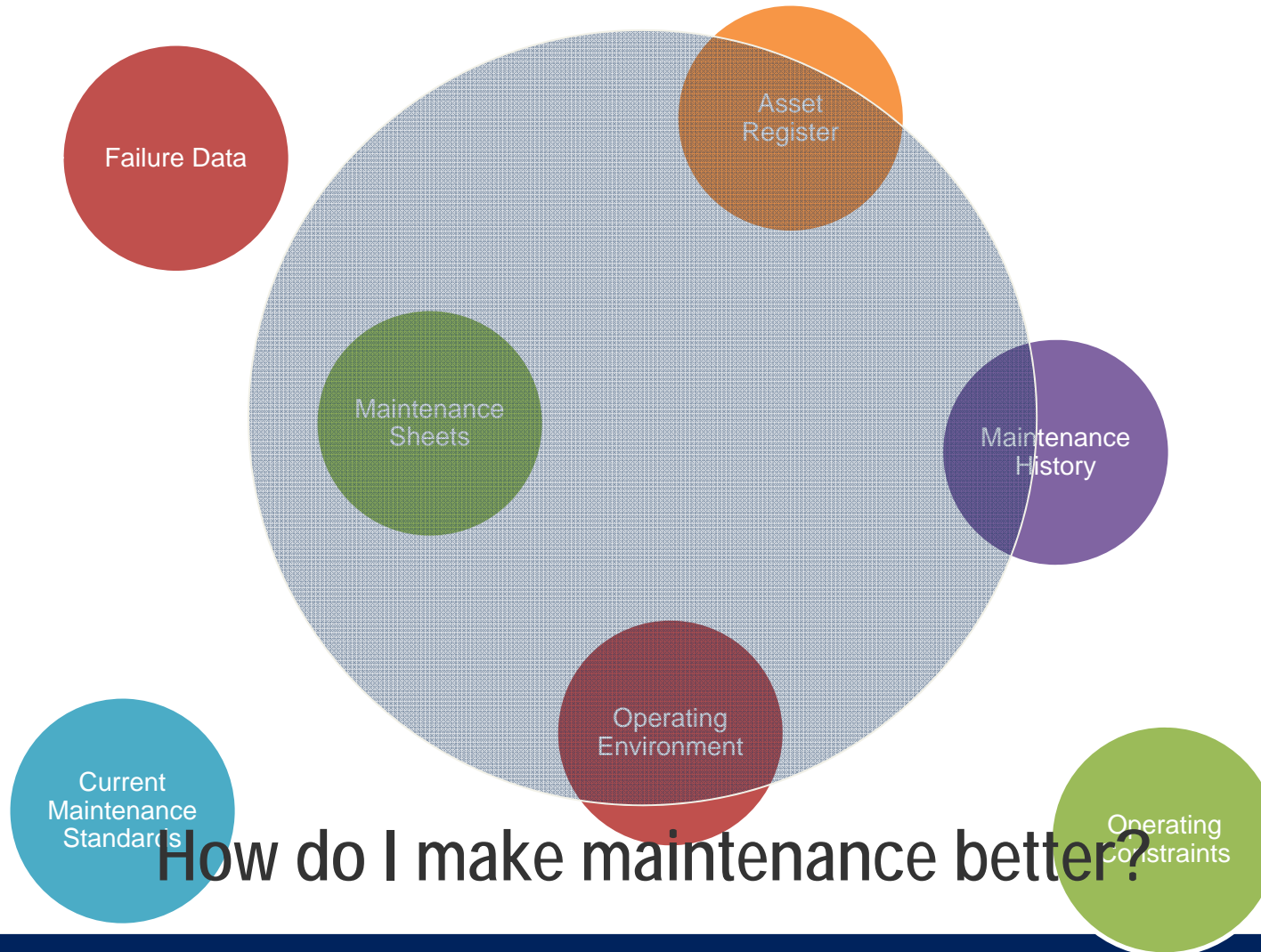
In Ausgrid the information is captured by;

- a) Maintenance requirements methodology
- b) Repair/Replace analysis
- c) Spares requirements methodology
- d) Condition of assets – ‘health index’
- e) Projections on required investment to meet needs

Basic Asset Life Cycle



What sort of information do you have



What are FMECA and RCM

- Failure Modes, Effects & Criticality Analysis is a structured process for:
 - Identification of equipment/system functions
 - Identification of functional failures
 - Identification of failure modes
 - Identification of the effects of failure
 - Assessing criticality of the failure
- Reliability Centred Maintenance is an analysis process centred on achieving inherent levels of equipment safety and reliability at minimum cost, using FMECA data as an input
- From this, maintenance tasks can be selected and packaged into a Technical Maintenance Plan

FMECA / RCM Outcomes

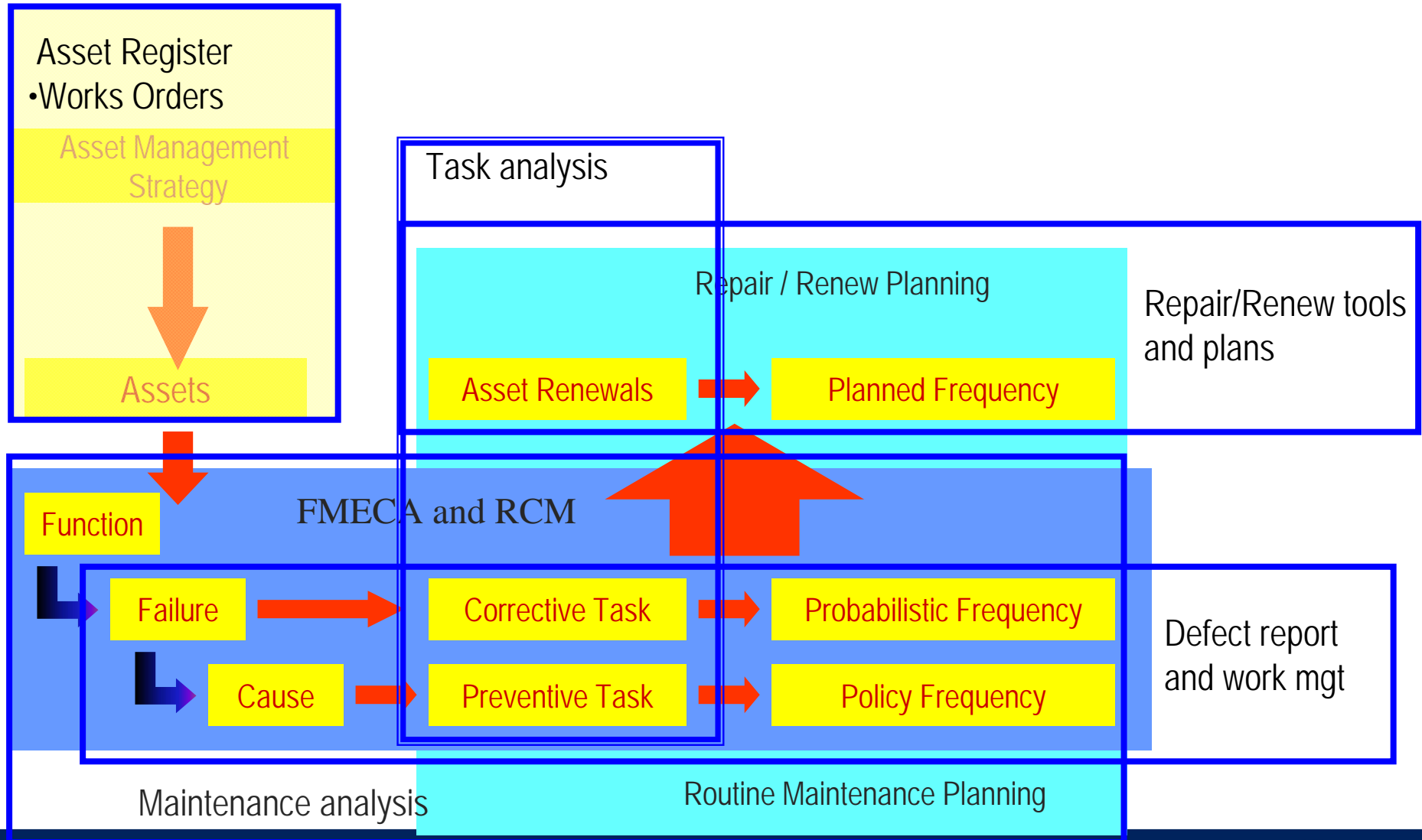
- So we can influence your repairs and renewals

- But what else can we do with the information?

What other areas can I start to influence?

- Replacement Strategy
 - Is it maintainable anymore?
 - Should I repair? Should I replace?
- Spares Strategy
 - What should I keep? How many should I keep?
- Design Standards
 - How can I enhance the design of my system?
 - How can I make my system more reliable?
- Procurement Strategy
 - How can I buy better assets?
- System Planning
 - How can I improve the configuration of my system?

a) Using FMECA/RCM to drive investment



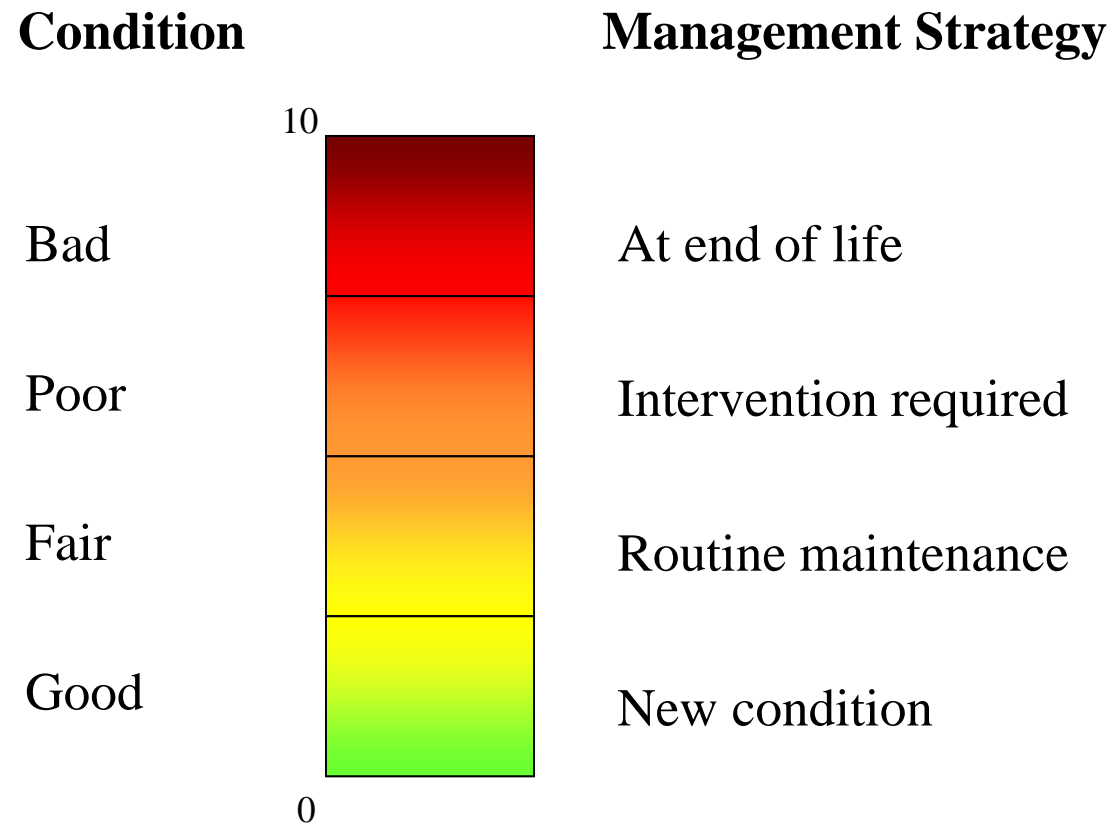
b) Repair/Replace Analysis

- Ausgrid developed a repair/replace decision making tool
- This model incorporates technical issues, risk costs & economics
- Firstly developed exclusively for transformers, but later developed into a generic model
- Assists in the determination of the lowest future cost of ownership of either repairing existing asset, or replacing the asset with a new one
- “Repair / Replace Decision Making Practices” presented at ICOMS 2007 – Gary Winsor / Steve Buncombe

c) Spares requirements methodology

- Outlines the framework for the acquisition, storage & maintenance of spare equipment within Ausgrid
- Helps ensure the availability, security & integrity of the electrical network, thus assisting in minimising the duration of customer outages
- Includes:
 - Failure recovery strategies
 - Methods for determining spares levels
 - Identification of relevant interfaces within the organisation
- “Developing & Implementing a Spares Strategy” at ICOMS 2007 presented by Alexandra Dean

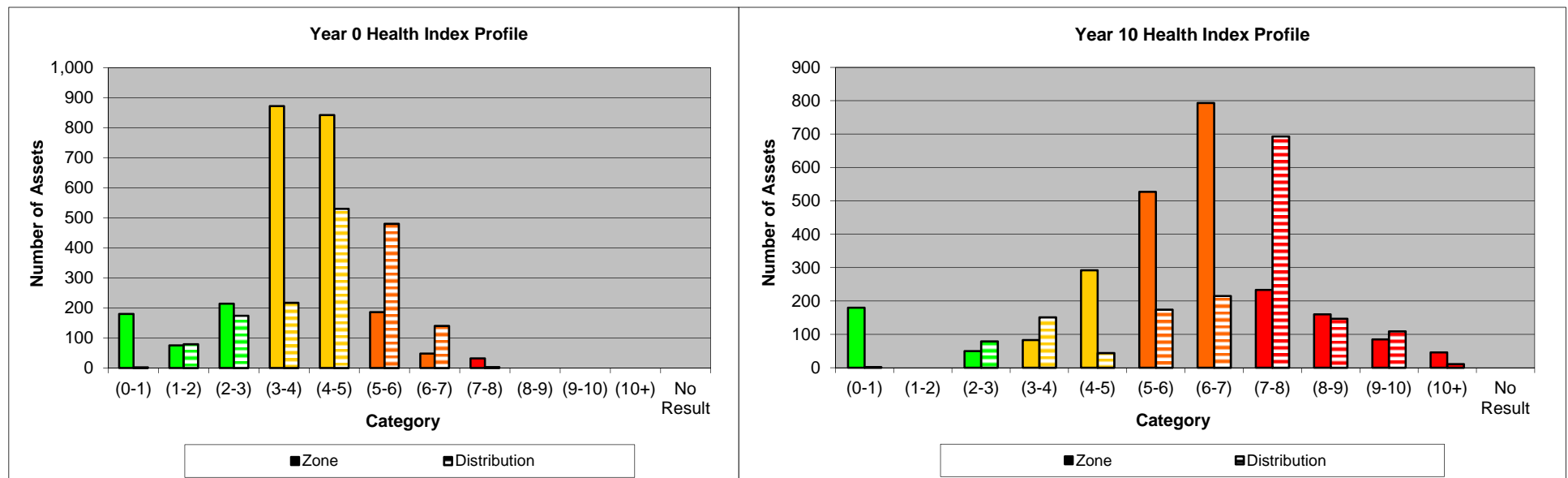
d) Condition of assets – ‘health index’



Note: This is not a linear scale

d) Condition of assets – ‘health index’ (Cont’d)

Circuit Breaker Health Index Profiles

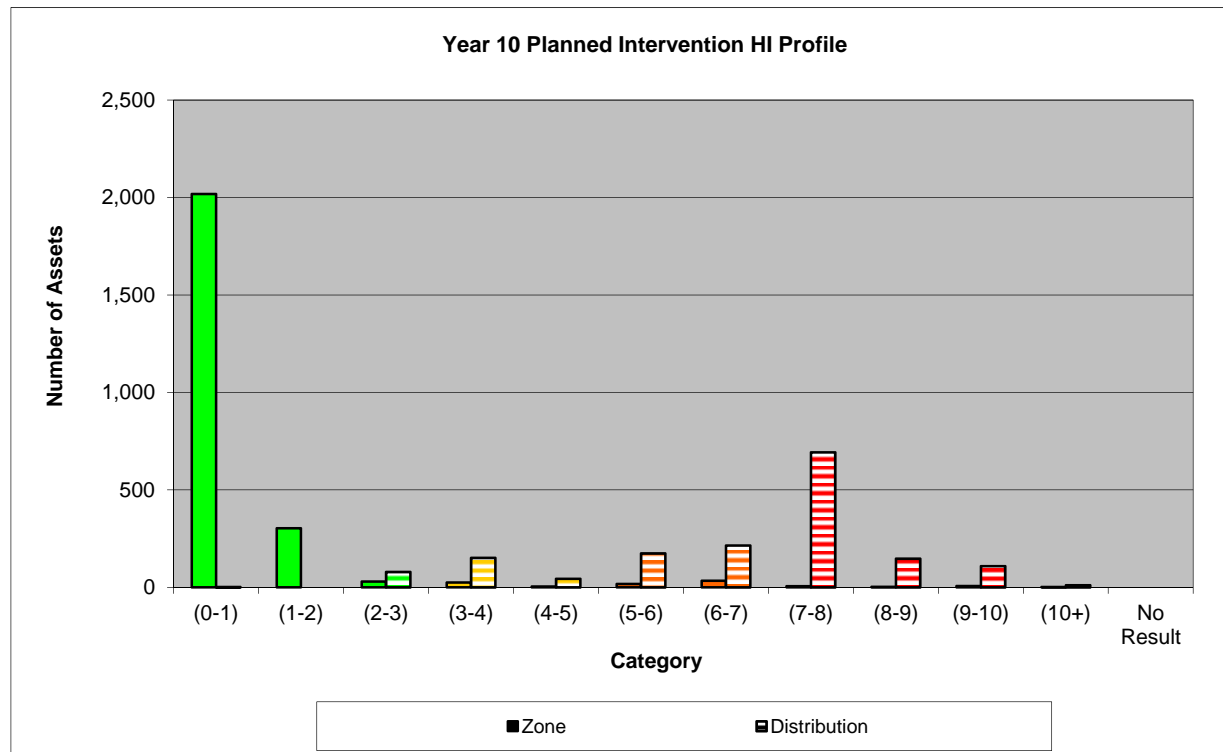


- CB assets HI view at 2011

- No replacement work completed
- CB assets aged 10yrs, HI view at 2021

d) Condition of assets – ‘health index’ (Cont’d)

Circuit Breaker Replacement Programme



e) Projections on required investment to meet needs

What are the long term impacts of varying the CAPEX or OPEX budgets by $\pm 10\%$?

- Asset failure rates
- System & asset reliability
- Emergency spares requirements
- The types of OPEX (e.g. breakdown, corrective)
- Output pricing
- Resourcing levels

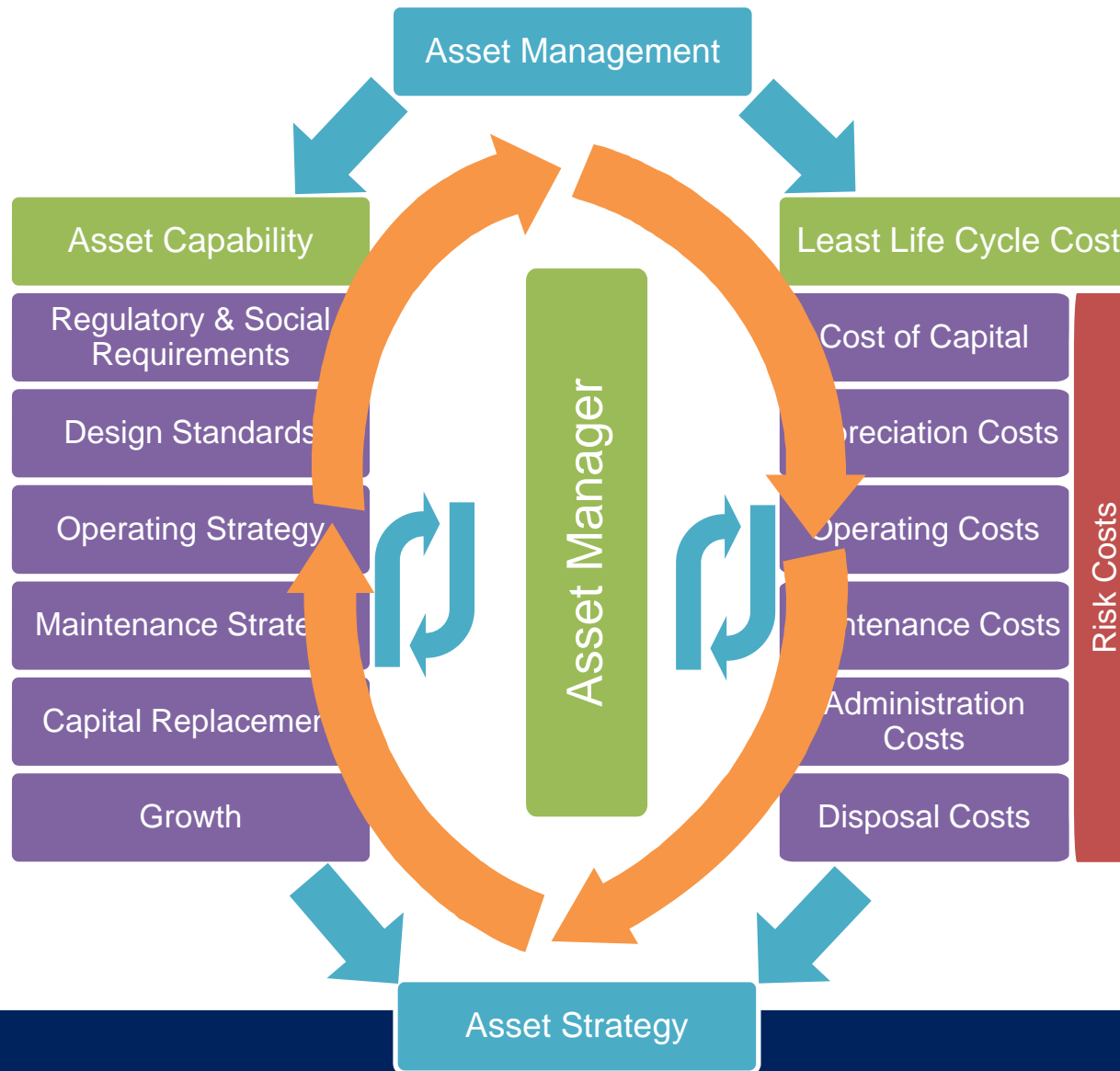
What is this all about?

- The tools and techniques we use translate and interpret the information being gathered in the maintenance and operation areas
- It is important to express this information in terms that your audience cares about.
 - What are their drivers?
 - What can you do for them?
- For Senior Management, this generally boils down to:

❖ Risk

❖ Expenditure

This is what Asset Management is all about

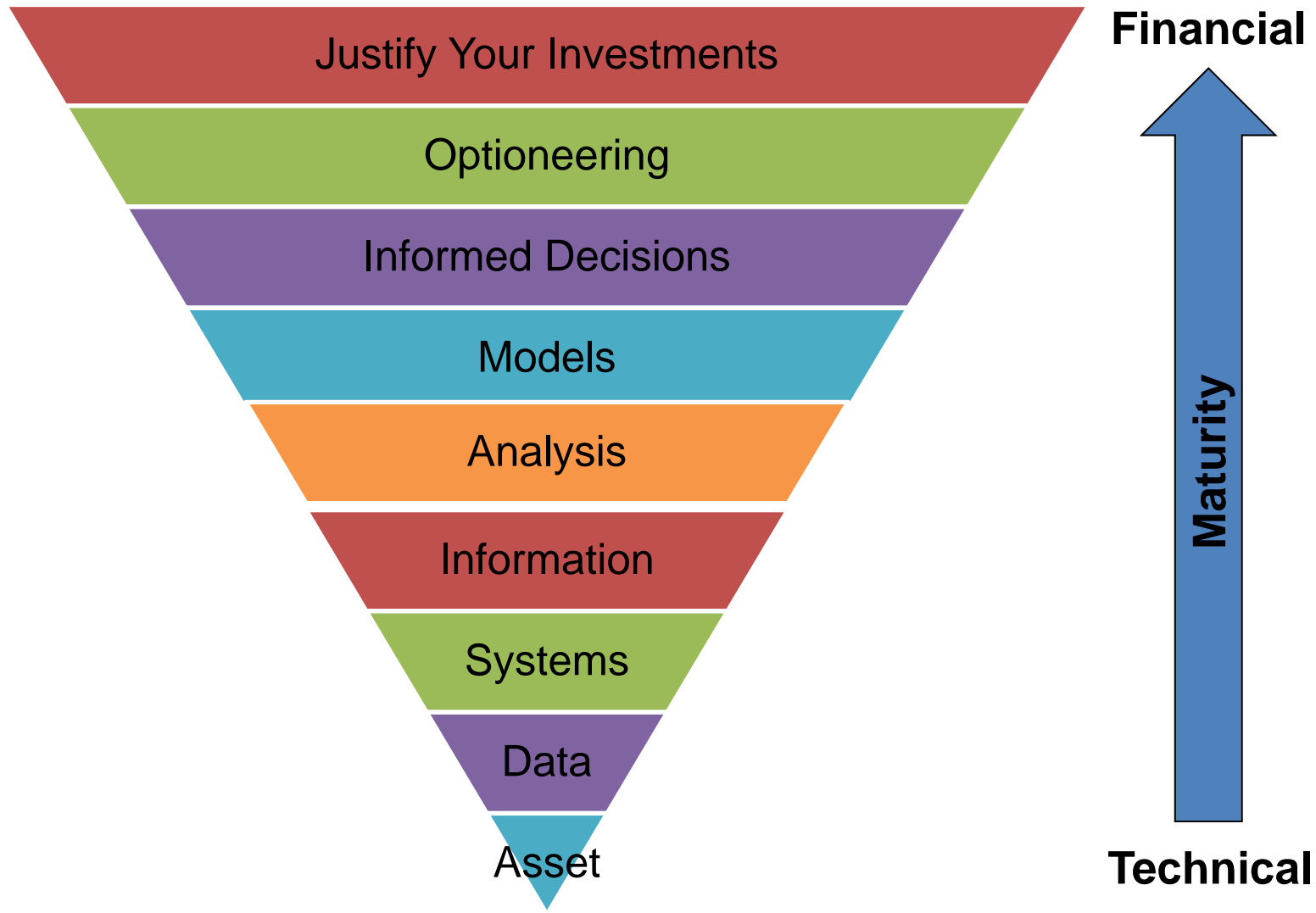


What are the top ten risks and their value?

Now having done all this analysis and modelling you should be in great position to answer the question of what are the top 10 risks and be able to articulate:

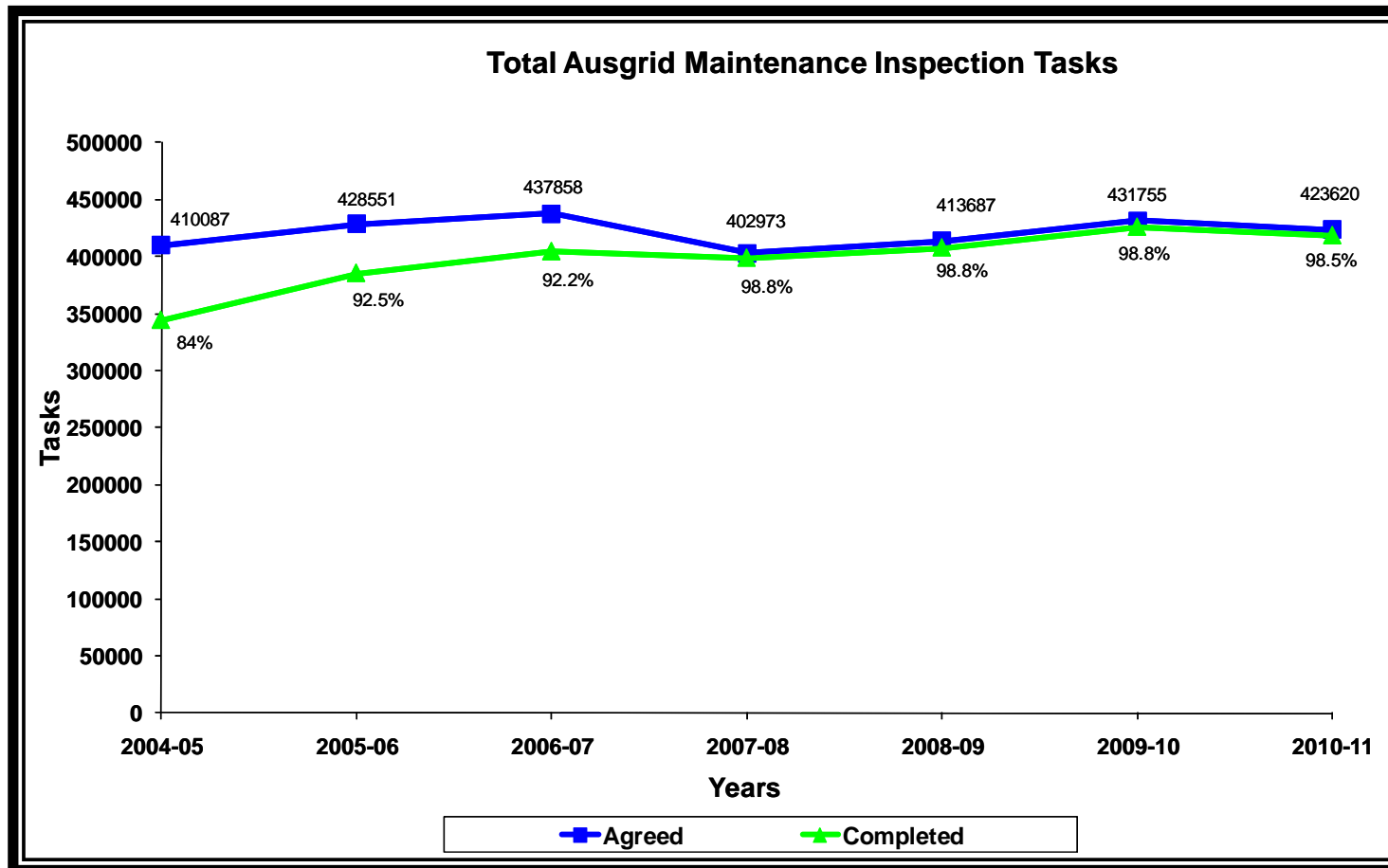
1. What they are and why
2. The probability of the occurring
3. The cost of them occurring
4. The impacts on your outputs
5. The impacts on spares and availability
6. The impact on OPEX and CAPEX
7. The impact on your brand
8. The impact on your stakeholders and shareholders
9. Any safety implications
10. Any environmental implications

Asset Management Maturity



What have been the outcomes

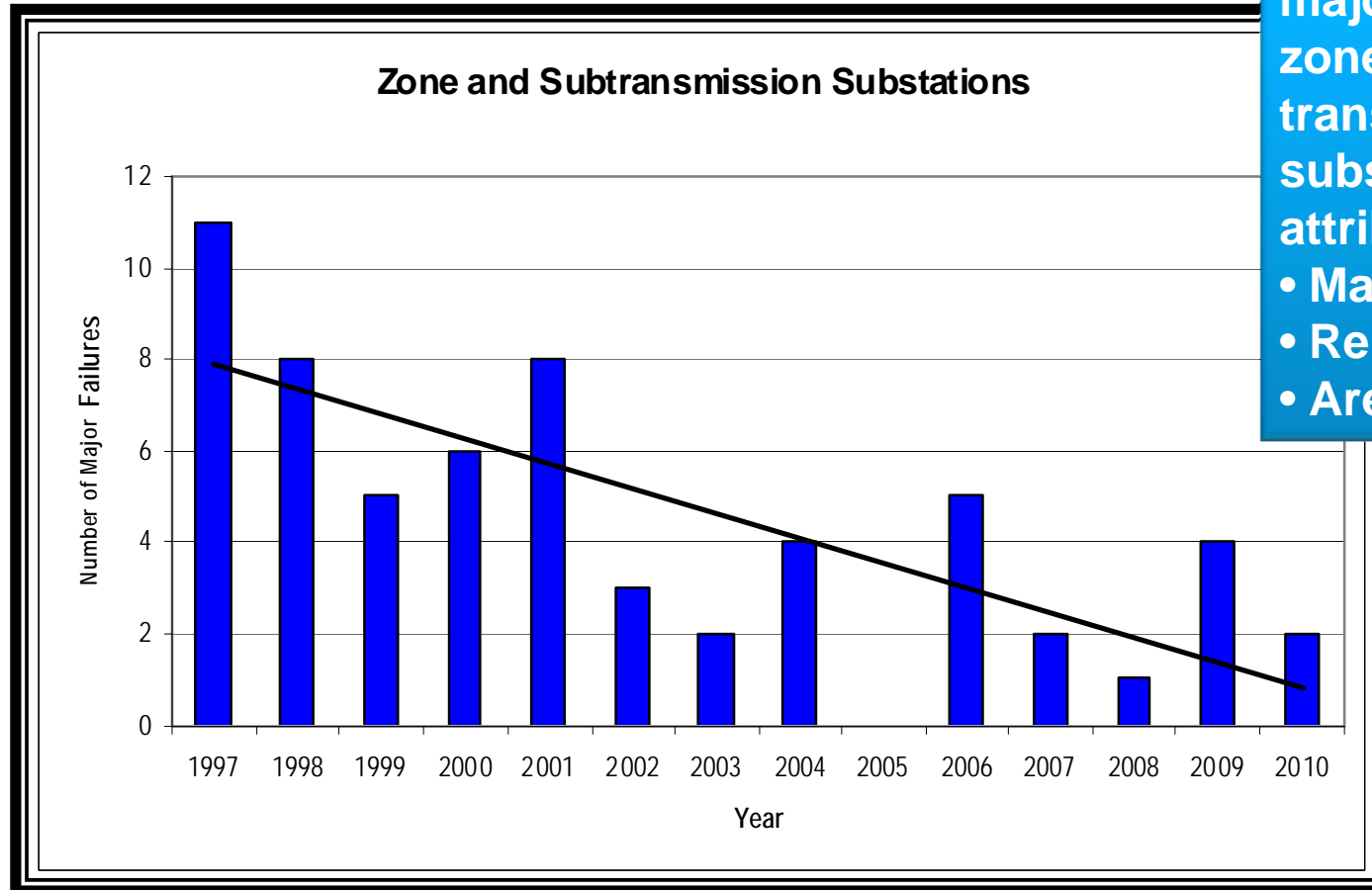
Maintenance Tasks



What have been the outcomes

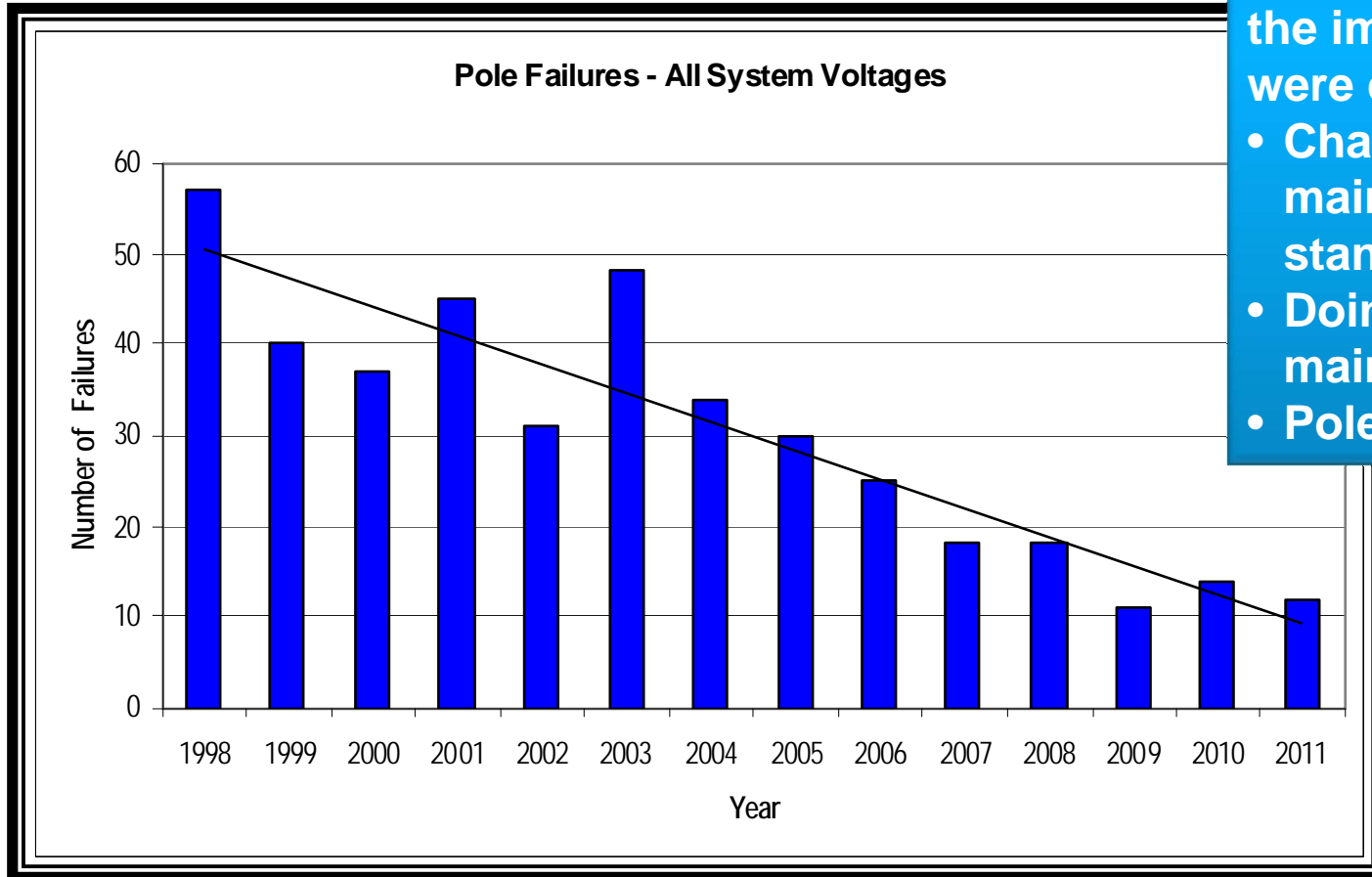
The reduction of major failures at zone and sub-transmission substation attributed to;

- Maintenance
- Replacement
- Area Plans



Major Asset Failures in Zone or Sub-transmission Substations

What have been the outcomes



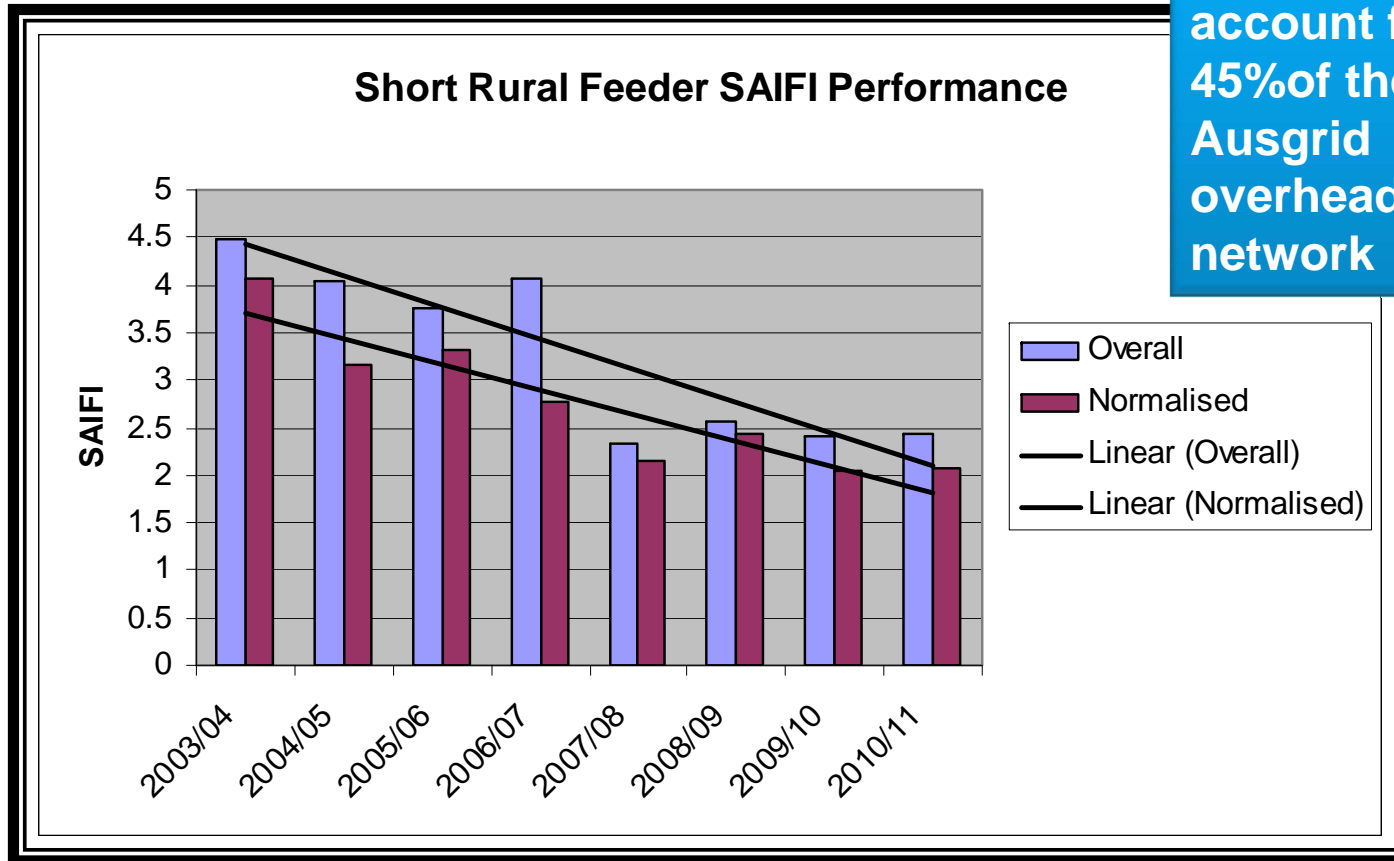
As with substations the improvements were due to;

- Changes to maintenance standards
- Doing the maintenance
- Pole replacement

Asset Failures – Poles (All System Voltages)

What have been the outcomes

Declining outages on short rural feeders, which account for 45% of the Ausgrid overhead network



Short Rural Feeder SAIFI Performance by Financial Year

In Closing

- Maintenance and asset data is extremely valuable information for predicting the future
- This information can be used for technical and economic decision making
- You can influence the rest of the business
- The board can make better informed decisions
- The Journey will continue

Thank you

Questions

