

SUCCESSFULLY MANAGING CHANGE IN THE ELECTRIC ENERGY INDUSTRY

JEFF ALLEN – CHAIR OF THE NSW/ACT CHAPTER OF EESA

MIKE SCHULZER – ACT CHAPTER CHAIR OF AMC

OVERVIEW

- There have been many changes in the electric energy area over the past 50 years
- More changes are continuing at an even faster pace.
- This presentation underlines the need to understand all the changes that are occurring because they
 - technical,
 - market,
 - management or
 - customer
- Infrastructure managers must update their knowledge, attitude and overall approach in order to be successful in the new business environment.

HISTORICAL DEVELOPMENTS

- The demise of the typing pool
- No more slide rules or “log tables”
- Introduction of mobile phones, personal computers and the internet (all in the 1980’s),
- Indoor switchgear, pole top reclosers
- SCADA
- Mapping systems, Asset Management and Work Management systems
- Sophisticated protection and control systems and ADMS

HISTORICAL DEVELOPMENTS

- Major Power Stations (from the mid 1960's)
- The east coast Transmission System
- Customer focus and “business improvement” (early 1990's)
- Asset Owner, Asset Manager and Asset Services (in the 1990's)
- Implementation of the NEM, Retailers, Metering Service Providers etc (in the mid 1990's)
- Privatisation of Generators, Retailers, Networks, Metering
- Energy/Demand management services
- The “smart” grid

WHAT'S NEXT?

- Falling costs of large and small scale renewables and other distributed energy resources are driving rapid deployment and are encouraging greater power system interdependence as well as independence.
- The change in mix of electricity generation requires new methods for managing system security (i.e. frequency, stability etc) and voltages.
- In addition, the dynamic behaviour of the distribution system provides new challenges for effective transmission and distribution network planning as well as its operation.

THUS - MANY AREAS OF CHANGE

- Market driven choices for customers
- Many new players entering the electric energy marketplace
- New market models
 - Demand Management
 - Demand Aggregation
 - Energy Monitoring and Management
- Tariff restructures
- Load defection – part and full
- New loads (electric vehicles) and distributed generation
- New customer needs – including improved understanding of consumption and costs and better control of consumption (down to a unit level)
- Shift to low carbon intermittent sources
- Growing complexity!!!

FUTURE ROLE OF DISTRIBUTION NETWORKS

A Distribution Network Operator is a Distribution System Operator!

- Locally move energy from customers with excess energy to customers with deficit
- Enable a market for excess energy
- Regionally move large renewable generation output
- Optimise diversity for load and generation to avoid over investment
- Provide backup capacity
- Operate platforms for new markets
- Provide economies of scale for managing distribution assets

INTELLIGENT NETWORKS & MARKETS

- There will be a need to develop tools for a cost effective integrated grid,
 - Establish open standards and protocols to enable secure system operation, management and exchange of information and interoperability with distributed energy resources
 - Enhance current system monitoring and models to inform advanced system planning
 - Build distributed energy resource maps and feeder hosting analysis to support locational valuation of distributed energy based services
- Everything is getting smarter
 - IOT
 - the number of connected devices will exceed 50 billion by 2020
 - Within 5 years over 20% of all energy consumed will be by IT
- A flexible and agile workforce to support the new optimised energy system

POWER SYSTEM SECURITY

With diverse generation and energy technologies being used there is the need for new frameworks and services to ensure system security.

- Review frameworks for protection systems, efficient capacity and balancing services
- New market frameworks for ancillary services
- New power system forecasting and planning approaches to anticipate system constraints
- Enhanced intelligence and decision making tools
- Close focus on physical & cyber security

BUILDING CAPABILITY WITHIN ENGINEERS

- Personal attributes and non-technical skills
- Work readiness
- Increased understanding of commercial and business fundamentals
- Improved technical skills & understanding of new technologies
- Asset Management & Project Management

SKILLS FOR THE FUTURE

- Systems Engineering, in particular Asset Management Systems
- System Planning, Design & Analysis
- Business & Commercial Management
- Intelligent Networks & Protection
- Renewable & Alternate Technologies

KEY ASSET MANAGEMENT REQUIREMENTS

- Top management support
- Dedicated long term commitment
- Asset management artefacts
- Information Systems
- Assessment

Top Management Support

Provide

- Sense of urgency
- Guidance
- Vision
- Communication
- Clear Obstacles
- Short term wins
- Victory over the long term
- Anchor changes

Dedicated long term commitment

- Influence
 - Extend Networks
 - Build relationships
 - Develop competency
 - Be Genuine
 - Think through influence barriers
- Nudge
 - Solve problems by using systems engineering
 - Develop the asset management system to meet regulatory requirements
 - Tell it as it should be, not how it is

Asset Management Artefacts

- Begin with corporate objectives
- Design a framework for your documents, based on the extent of the asset management system
- Draft the framework document
- Develop high level documents first, maintain alignment
- Documents should progress from policy to strategy to objectives to plans
- Integrate with existing documents such as procedures

Information Systems

Support by a System of Applications aligned to provide:

- Data storage and manipulation
- Operational support – network operations and works management
- Decision support – capital investment, augmentation, maintenance
- Risk Management – maximum risk reduction for expenditure
- Reporting Tools – feedback on actual vs planned progress

Assessment

- Pre-certification Audits
 - At least annually
 - External audit every 3 years
 - Internal audit by qualified staff
 - Keep detailed records of audits
- Certification Audit
 - Prepare schedule
 - Brief field and office participants
 - Have documents ready
 - Ensure IT systems operational

DON'T FORGET THE BUSINESS BASICS!

- With all this change you need to ensure that the correct policies, standards and procedures are in place and are followed by well trained, knowledgeable and dedicated people
 - to ensure the safe and reliable performance of the network
 - for the benefit of customers and the overall community
 - under normal and all adverse conditions likely to impact on the network
- The following describes an incident that provides good lessons in what happens as a result of not getting the business fundamentals right all the time
- **“What can go wrong sometimes does!”**

AUCKLAND POWER FAILURE - 1998

This was a five-week-long outage affecting the city of Auckland, New Zealand

- At the time, almost all of the Auckland CBD was supplied via four 110 kV power cables from Transpower's Penrose substation,
 - Two cables each to central city substations at Liverpool Street and Quay Street
- The two cables connecting to Quay Street were 40-year-old gas-insulated cables that were past their replacement date.
 - One of the Quay Street cables failed on 20 January, possibly due to the unusually hot and dry conditions
 - The second Quay Street cable failed on 9 February, leaving only the Liverpool Street cables supplying the city.
- The remaining two Liverpool St (oil filled) cables failed on 19 and 20 February, resulting in about 20 city blocks (except parts of a few streets) losing all power.
- The NZ Government set up a special Inquiry into the event

AUCKLAND POWER FAILURE - 1998

- The CBD network was planned consistent with industry practice;
- While Mercury Energy was a competent distribution company, it did not have the required expertise, operations and management procedures for the 110 kV cables;
- The cause of repetitive gas leaks and faults was not resolved by systematic investigation;
- A well-developed asset audit and asset management programme for the 110 kV cables did not exist;
- Maintenance contracts for the 110 kV cables were deficient in terms of their specification, management and monitoring;

AUCKLAND POWER FAILURE - 1998

- The specification/rating of the 110kV cables was never checked nor reassessed against the “as built” conditions;
- Mechanisms for accountability and monitoring of network risk management were not overseen by the Risk Management Committee, but were reportedly handled directly by the Board;
- The 110kV transmission risk in 1997 was materially underestimated and as a consequence actual security of supply was under-planned;
- The reliance on informal arrangements for the pooling of spares for the 110kV cables was ineffective as shown by at least one incident prior to 1998

AUCKLAND POWER FAILURE - 1998

- Mercury Energy placed heavy reliance on the 110kV oil cables, which was unaccompanied by any investigation of their actual conditions;
- While network planning was not a contributing cause of the power supply failure, had the actual oil cable conditions and “as built” ratings been known, a different network planning outcome may have resulted;
- Mercury Energy’s risk management and contingency planning for the 110kV cables were a contributing factor in the power supply failure;
- AEPB and Mercury Energy’s operations and asset management practices for the 110kV cables were below industry standards and this was a contributing factor in the power supply failure; and
- The corporate governance structure of Mercury Energy did not cause the power supply to fail, but through its effect on governance an opportunity to prevent it was lost.

ACHIEVING NETWORK BUSINESS SUCCESS

From the above example - how can such obvious errors/oversights occur?

- Lack of “Network Knowledge”
- Not doing the all the “right things right” (all the time)

The Key Issues for successfully managing Networks are

- Good Network Knowledge (People and Systems)
- Good Asset Management Processes (and the supporting Information Systems providing timely, accurate data)
- Timely actions by well trained, focussed and motivated people under the leadership of competent managers who are creating the right culture
- Reviews/audits
- Easy to say – but really hard to do well all the time – particularly in changing times!
- Often it’s the simple things that cause the problem!
- Poor risk management can be dangerous, expensive and embarrassing!

ACHIEVING NETWORK BUSINESS SUCCESS

Achieving the right business outcomes **requires all risks to be successfully managed** and this requires “**Network Knowledge**” and the right “**checks and balances**” being in place across the business

- Skills of experienced asset management and asset services teams and
- Timely use of data provided by the asset and works management (and associated) systems and
- Turning this data into information and knowledge using decision support tools to ensure objective fact based optimal asset outcomes.
- Then making the “right decisions” and ensuring that these actions are done and “done right” – in accordance with the organisational strategies, objectives, policies and procedures

SOMETHING TO CONSIDER

- Business Success is achieved by
- Satisfying customers (with the right products and services) through
- Efficient and effective processes/systems and the key to all this is
- **Innovative, motivated, happy and knowledgeable people** under the leadership of competent managers creating the right culture.

Is this still how to satisfy customers in the new business environment?

QUESTIONS?