

Physical Asset Strategy Development and Implementation at Powercor Australia Network.

Phil Clarke, Director, The Asset Partnership
Vince Power, Manager, Asset Strategy & Infrastructure, Powercor Australia

SUMMARY: This paper outlines the further development of Physical Asset Management Strategies and Plans and supporting processes at Powercor Australia Network during 2001. Asset Management Plans and Network Element Plans have been introduced to improve management focus on asset management and to co-ordinate planning, construction, and maintenance activities.

Keywords: Asset Management Strategy, supply reliability, Asset Management Plans, Asset Maintenance Policies, Reliability-centred Maintenance

1 INTRODUCTION

In 2001, Powercor Australia (PCA) Network (PCN) further developed its Asset Management Strategy and processes in response to significant organisational and strategic change within PCA and a change in focus by the Office of the Regulator General (PRG) from cost efficiency to supply reliability improvement.

The result has been the further evolution of PCN's overall Asset Management Strategy (which was originally developed in 1997) and the development of new asset management tools in the form of Asset Management Plans, and Network Element Plans.

This paper outlines the evolved strategic and process framework and tools that have evolved in the development of the Asset Management Strategy "Mk 2" (AMS 2).

2 SETTING THE SCENE FOR AMS2

2.1 Background to PCA and Asset Management Strategy Mk 1 (AMS1)

PCA is responsible for the distribution of power in the western part of Victoria. Its network area covers over 150,000 square kilometres with 500,000 domestic and industrial customers and extends from the South Australian border and much of the NSW border. It includes the major provincial centres of Ballarat, Bendigo, Geelong, Melton, Mildura, Shepparton, and Warrnambool. PCA has significant high and low voltage distribution assets, including nearly 500,000 poles in approximately 60,000km of distribution circuits, over 60 zone sub stations and over 60,000 distribution sub stations. These assets currently have a replacement value of approximately \$1.5 billion. Assets range in age from modern to over fifty years old.

PCA came into being as a result of the privatisation of the Victorian electricity industry under the Kennett government in the mid 1990s, and was one of five distribution companies created from the break up of the former State Electricity Commission (SECV). The break up of the SECV and subsequent industry privatisation created a new business and legislative environment. The Office of the Regulator General (ORG) oversees the privatised electrical distribution industry, and currently regulates tariffs in addition to setting service delivery standards in conjunction with the National Electricity Market. Both are directly related to how distribution assets are managed and maintained. In addition, the Chief Electrical Inspector (CEI) oversees matters relating to safety.

PCA recognised that a more effective approach to managing its extensive asset base would be required to meet its future business needs and those of the new regulatory environment in which it operated. After initial review by GHD in 1995, Price Waterhouse Urwick (PWU) was selected in late 1996 as their Asset Management Strategy (AMS) implementation partner. Subsequently in 1997, the initial Asset Management Strategy was developed with PWU's assistance. An important part of this strategy was the development of 63 Asset Maintenance Policies through the applications of Reliability-centred

Maintenance II (RCM II). In addition to raising awareness of the requirements of asset management, the application of RCM II resulted in more cost effective and efficient preventive maintenance and inspection practices and techniques.

An important interface with the 1997 AMS implementation was the “People, technology and Processes” (PtP) project. PtP was the major PCA process re-engineering and systems implementation project which pivoted around the implementation of SAP R/3 integrated business software, including the Plant Maintenance (PM) module, which is utilised for works and asset management. The AMS and PtP projects developed a close working relationship, as the use of the SAP PM module has been key in the successful implementation of the AMS.

The overall Asset Management Strategy philosophy was summarised in its overall “mission statement” and objectives. These were:

“Asset Management is the structured and systematic approach to acquiring, managing, maintaining and disposing of assets so that Powercor’s customers’ and business needs are met, and its obligations to share holders, the community, government and regulator are satisfied.

Asset management will address:

- *reducing the need for new assets by adoption of “non asset” solutions where it is cost effective to do so;*
- *ensuring that existing assets are effectively and efficiently utilised;*
- *optimising total life cycle cost of assets from acquisition operation, and maintenance, to disposal; and*
- *establishing clear accountability and responsibility for assets and their performance.”*

This overall statement and objectives were supported by an Asset Management Model, which identified all the major activities required throughout the asset life cycle. Within the overall strategy document, organisational accountabilities for these activities were assigned, along with overall performance measures. The model is shown in the figure below:

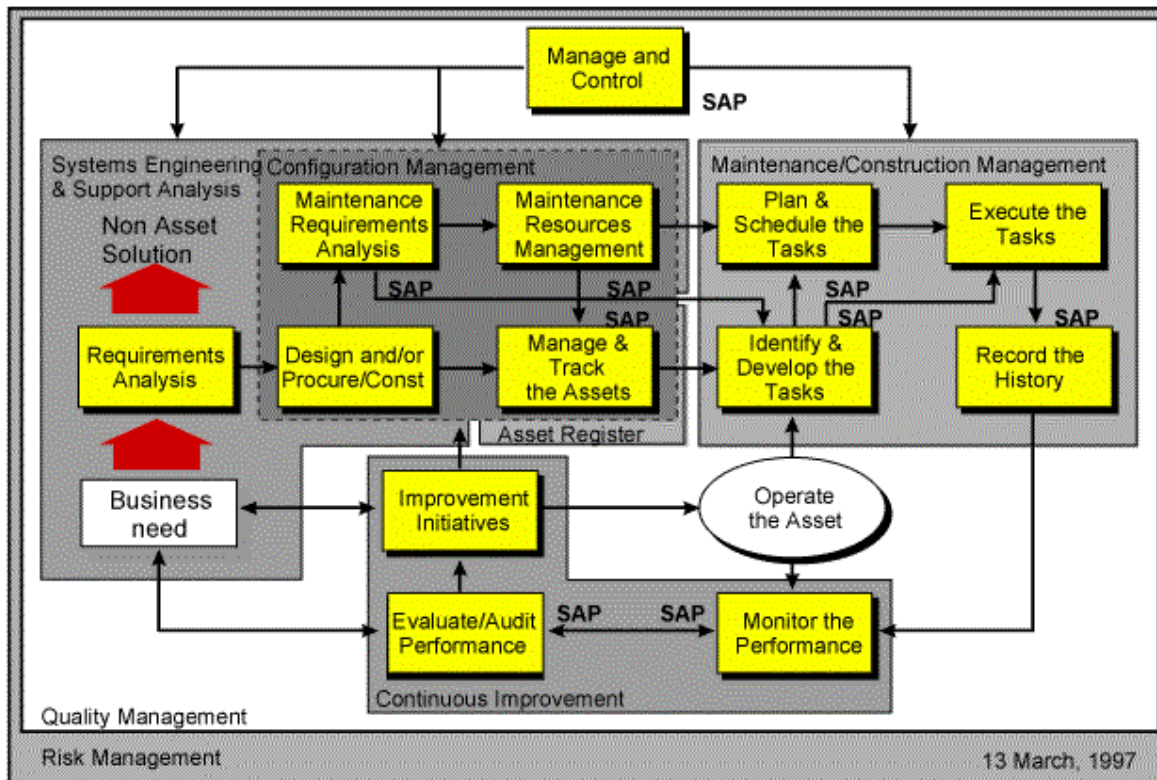


Figure 1. PCA Asset Management Strategy model, 1997

2.2 AMS Evolution 1997 – 2001

The period from the introduction of the AMS and SAP PM system to 2001 was one of consolidation, learning and skills enhancement. The use of the SAP PM and supporting IT applications allowed for greater control of maintenance and construction activities and costs, and importantly, allowed the collection of and subsequent analysis of far more comprehensive failure, asset performance and general management information than previously.

These benefits were a business necessity within the new electricity market, where key stakeholders such as the ORG, the CEI and insurers required in depth reporting of financial and asset performance, regulatory compliance, and risk management. Techniques such as RCM, life cycle costing, and design checklists were applied on a routine basis or as required to improve asset performance.

3 ALL CHANGE IN 2001

3.1 New Owners and New Directions

The only constant in life is change, and nothing is truer in the power distribution industry in the 21st Century. The first major change for PCA was a change of ownership in 2000, and the subsequent decision by the new owners to sell PCA's retail arm (to Origin Energy). Consequently, PCA's "core business" is now as the owner and operator of an electrical distribution network, much rather than as a buyer and seller of electricity.

As would be expected, a change in ownership and strategic direction was accompanied by changes in management structure and key personnel. There were a number of changes in the overall roles of Powercor Network (PCN) and its internal service provider, Powercor Services (PCS). For example, responsibility for detailed maintenance planning passed from PCN to PCS. The change of organisational arrangements was also accompanied by changes in key personnel, with a number of managers (who had been involved in the development of the original AMS) either leaving the organisation or moving to new positions within PCN or PCS. New managers also joined PCN & PCS in key positions.

Consequently, by 2001 the 1997 AMS had become dated from a strategic and organisational perspective, as key activities and accountabilities were assigned to positions which no longer existed.

3.2 Changes in Regulatory Focus

The second major factor prompting a review of the 1997 AMS was a change in focus by the ORG from cost control to service level reliability.

Prior to 2001, the regulator's principal role had been in the regulation of network charges through regular Network Pricing Reviews based on complex formulae that took into account maintenance and capital expenditure. The annual budgets for both capital and recurrent expenditure are subject to ORG scrutiny. Not un-naturally, this regulatory focus also caused the companies (including PCA) to focus quite closely on controlling and justify their maintenance and capital costs to the regulatory.

In 2000, the ORG commissioned a review of system service level reliability of both TXU and PCA following customer complaints. Both companies were complying with overall ORG network wide targets for service level reliability, but as could be expected some customers were experiencing reliability levels substantially below the network average. The review reported some deficiencies in PCA Asset Management practices, and confirmed that there were a number of feeders with reliability performance below acceptable levels.

Subsequently, the ORG has set new targets for network service level reliability with an immediate "step change improvement" followed by a consistent annual reduction in the measures of System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), and Customer Average Interruption Duration Index (CAIDI)ⁱ. The past and future targets and PCA performance is shown below.

ⁱ SAIDI = total customer minutes lost / total number of customers, SAIFI = total customer interruptions / total number of customers, CAIDI = SAIDI / SAIFI

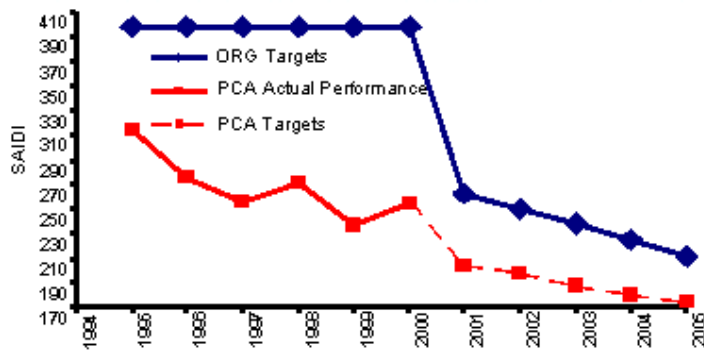


Figure 2. ORG & PCA Service Level Reliability performance and targets

As is apparent from the graph above, PCA current reliability performance will satisfy 2001 targets, but further performance improvement is required beyond 2002 if the ORG’s targets are to be met.

3.3 Meeting the Challenge

PCA adopted a number of management initiatives to address the challenges presented by the ORG’s new reliability targets. The first of these was the development and implementation of a short term Reliability Improvement Strategy (RIS) to help achieve the initial “step change” in reliability performance required in 2001/2002. This strategy consisted of a number of sub projects aimed at reducing planned and unplanned interruptions.

These included:

- Planned minutes lost reduction
- Unplanned minutes lost reduction
- Fault location and Impact Minimisation
- Fault attendance and repair
- Reporting network & feeder information
- Improved customer information
- Management of supply risk
- Capital works

It was evident that while the RIS will address some immediate issues relating to overall reliability improvement, other changes in day to day asset management activities were required to ensure a sustainable and consistent improvement in service level reliability. One of the identified initiatives was the development of the Asset Management Strategy Mk 2.

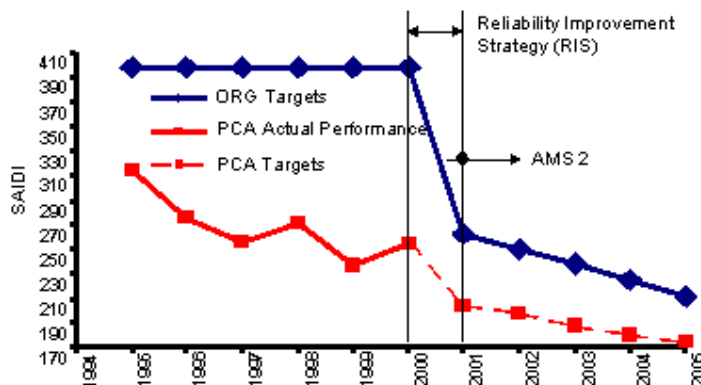


Figure 3. PCA Service Level Reliability improvement initiatives

4 ASSET MANAGEMENT IMPROVEMENT STRATEGY MK 2

4.1 Overall Approach

The successful 1997 Asset Management Strategy was used as the basis of AMS Mk2, and as such, AMS2 is an evolution much rather than a revolution. The overall approach adopted consisted of a number of basic steps. These were:

- **Review AMS2 statement and objectives.** The centrepiece of the AMS2 is its basic “mission statement” of intent and objectives. These were reassessed in the context of the PCA’s changed internal circumstances and the regulatory and commercial environment.
- **Develop AMS2 Model and High Level Processes.** If the AMS2 statement and objectives is the centrepiece then the AMS2 “model” is the first step in translating ideas and concepts into practical and workable policies and processes. The suitability of the existing model (which identifies all the processes required to support assets in their life cycle) was reviewed.

The high level AMS2 "model" was then “drilled down” to identify the next level of detailed processes and policies. These were compared to PCA’s existing processes and policies. This step was critical in ensuring that the regulatory requirements for improved network reliability performance will be met.

- **Assign Managerial Accountabilities within the Strategy.** As in the case of the existing AMS, managerial accountability and responsibilities for AMS2 within PCA’s new management structure were allocated.
- **Assess and Identify System Needs and Requirements.** As noted above, Powercor implemented SAP R/3 ERP and in particular PM, MM and PS modules supported by other applications such as Smallworld GIS and “PowerOn” as the basis of its network asset management business systems. Timely, relevant and actionable management information is the life blood of successful Asset Management, and the information requirements of AMS2 against current system capabilities were reviewed.
- **Assess and Review the compliance with and effectiveness of Asset Maintenance Policies:** As noted above, some 63 Asset Maintenance Policies were developed under the auspices of AMS1, and a review of how many of these had been implemented (through the SAP PM Module).
- **Document Revised AMS2.** The revised and agreed AMS2 and supporting reports and processes were then documented as a cornerstone of PCA’s corporate policy.
- **Identify Need for Change Initiatives.** The development of the AMS2 may identify change initiatives for implementation or for performance improvement in associated areas. These will be identified, and change initiatives or plans developed.

4.2 AMS2 Framework

A major change from AMS1 to AMS2 was the development of an overall policy and planning framework to ensure proper co-ordination of all Asset Management processes throughout the asset life cycle. This AMS2 framework also needed to take into account the complex web of related policy documents and plans, such as The Bushfire Mitigation Strategy Plan

PCA’s electrical distribution network is dynamic and subject to continuous change and evolution in response to a range of business and other drivers. These include:

- New demand for electrical supply to points of supply not covered by PCA’s existing network.
- The growth (or contraction) of existing electrical demand within the PCA network.
- Changes in legislative or regulatory requirements stemming from the continuing evolution of the national electricity market and industry reform in general.
- Increasing service level expectations from retailers’ customers and the community as a whole.
- Evolving environmental requirements, such as Greenhouse Gas Initiatives.
- Emerging technology, such as co-generation and the increasing use of renewable energy sources for decentralised generation. (eg, wind farms, solar farms, etc)

As such, at any point in time, PCA network assets will encompass the full range of the asset life cycle from identification of need, to creation, operation, maintenance, and eventual disposal.

4.3 Revised Mission Statement and Objectives, Processes and Accountabilities

Following interviews and discussions with a number of senior and middle managers in both PCN and PCS, it was found that the AMS “mission statement” and objectives need only minor changes to place additional emphasis on service level reliability awareness and improvement.

The revised statement is:

“The objectives of Powercor Australia’s Asset Management Strategy is to ensure that its network assets are managed in a demonstrably responsible and cost-effective manner for the benefit and satisfaction of its owner, customers, regulators, and other stakeholders. Specific objects are to ensure:

- *Customer requirements are satisfied;*
- *Service level targets for reliability and quality of supply specified by the regulators are satisfied or exceeded;*
- *Network safety meets or exceeds the requirements of Electrical Safety (Network Assets) Regulations as updated and other statutory requirements;*
- *Network security of supply risks are identified and effectively managed;*
- *Environmental requirements and initiatives as specified by statutory requirements and guidelines such as Greenhouse Gas Initiatives are met or exceeded;*
- *PCA’s owners receive a competitive return on their investment; and*
- *Risks are identified and effectively managed.*

4.4 Asset Management Model, Processes, Accountabilities, and Performance Measures

The Asset Management Strategy model as displayed in Figure 1 was retained without amendment, as it was felt that it adequately reflected the steps and high level processes required in the management of PCA’s network assets.

The supporting descriptions of each of the steps in the model contained in the AMS were amended and updated to reflect changes in objectives, with greater emphasis being given to supply reliability and security, and risk management in general. The managerial accountabilities for each step were reassigned to the new positions within PCN and PCS.

The performance measures contained in AMS1 were reviewed and amended where appropriate to reflect the new focus and objectives.

4.5 Network & Regional Asset Management Plans

The most notable feature and change in the overall AMS2 strategic and policy framework has been in the introduction of the Network & Regional Asset Management Plans and Network Element Plans.

One of the criticisms of the ORG review of PCA service level reliability was that even though it had a high level Asset Management Strategy, PCN lacked more “tactically orientated” Asset Management Plans which stated how the strategy was being reflected in actual planning, creation, operation and maintenance of distribution assets.

The AMS2 framework has addressed this criticism by introducing an overall Network Asset Management Plan which will have a ten year horizon but will be updated annually. The Network Asset Management Plan will be a summary of the more detailed Regional Asset Management Plan (one of which will be prepared by Regional Asset Managers for each of PCA’s seven regions).

It was a primary objective in determining the contents of the Network & Regional Asset Management Plans that they be useful and productive management tools, and not reports and plans that are produced for bureaucracy’s sake. The format and contents of Asset Management Plans as detailed in the International Infrastructure Management Manual were used as the basis for those adopted by PCA. This is also consistent with the format of Network Asset Management Plans that are mandated under legislation for New Zealand’s distribution companies.

The major headings and contents of the Network & Regional Asset Management Plans are:

- **Executive Summary** contains an overall summary of the plan, and the major highlights and significant issues that it contains.

- **Introduction** gives the background of the plan, its scope, and the time period which it covers.
- **Community** will be included in Regional Asset Management Plans to identify particular community issues relating to the region. This will include information such as local demographics, customer numbers and types, any local environmental or risk management issues, and local interest groups and stakeholders.
- **Levels of Service** summaries past and future service levels (reliability, quality of supply, etc) and gives targets for the plan period. Specific service level improvement initiatives and projects are detailed.
- **Asset Description** describes the asset base which the plan covers, and provides various statistical information such as number of sub stations, circuit length, installed capacity, etc.
- **Future Demand** describes the expected future changes in demand (both expansion and contraction) within PCA's network area.
- **Asset Development** details specific asset creation projects being undertaken within the plan period. This will include capital projects to create new assets, or re-enforcement projects to upgrade the capacity of existing network assets.
- **Network Maintenance** describes the planned and unplanned maintenance activities to be undertaken within the plan period. This includes vegetation management, routine maintenance on primary and secondary sub station plant, and feeder inspection and repair.
- **Risk Management** examines all identifiable man made and natural risks to the PCA network. Security of supply risks are identified and risk management strategies discussed.
- **Plan Information** contains details of the plan, its sources, and its period of validity.
- **Financial Summary** gives high level details of financial information behind the plan, such as recurrent and capital expenditure within the planned period.

A number of headings that are contained in the International Infrastructure Management Manual asset plan format, such as details of Asset Management organisational structure and systems, have been incorporated into the high level Asset Management Strategy document.

4.6 Network Element Management Plans

The Network & Regional Asset Management Plans detail how all of PCA's network assets are to planned, managed, and maintained within the planned period, but they do not specifically spell out the underlying philosophy and strategy behind the life cycle management of particular asset groups or types.

This gap is to be filled by the Network Element Management Plans. These are being prepared to cover the groupings of assets as set out by the ORG for Service Level Reliability targets in addition to other asset groups. These are:

- Sub transmission lines
- Zone sub stations
- Urban feeders
- Rural short feeders
- Rural long feeders
- Protection
- Communications and Control Systems

Unlike the Network and Regional Asset Management Plans, the Network Element Plans are "standing" planning documents, and are not limited to any particular period of time. The contents of each of these Network Element Plans will cover:

- **Introduction** gives the background of the plan and its scope.
- **Network Element Description** will describe the range and type of individual asset types or groups which are included within the scope of the plan.
- **Levels of Service** will describe the levels of service requirements for the network element, and describe the general approach and processes for achieving service level performance improvement.
- **Lifecycle Management** describes the overall approach to managing individual assets groups or types within the scope of the plan, such as procurement policies, expected life, and criteria for retirement, such as time in service or condition based.
- **Maintenance Management** describes the overall approach to planned and unplanned maintenance activities for the asset types and groups included within the scope of the plan. Applicable Asset Maintenance Policies are referenced.
- **Network Issues** will examine the role that the particular Network Element plays in PCA's overall distribution network, the interfaces, and how its performance can influence overall network performance in terms of service level delivery and safety.

- **Risk Management** examines risk management issues that relate to the network element, including security of supply, and physical and environmental risk. Strategies for managing these risks are discussed.
- **Plan Information** contains background information for the plan itself, including sources of information, contributors to it, and the person responsible for its upkeep and co-ordination.

5 PULLING IT ALL TOGETHER

5.1 Organisational Responsibility for AMS2

As in the case of AMS1, the overall responsibility for development and update of the overall Asset Management Strategy rests with the Asset Strategy and Infrastructure Manager, who reports directly to the Manager Asset Management. AMS2 is signed off by the General Manager Network and Manager Asset Management. (The PCN Asset Management Group Structure is shown below.)

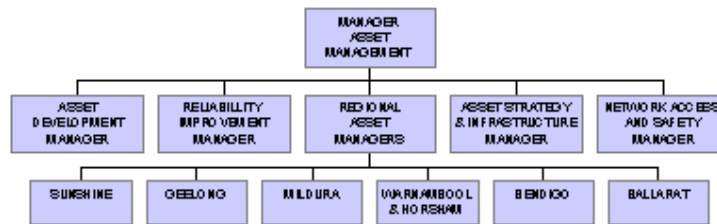


Figure 5. PCA Asset Management Group Structure

The annual Regional Asset Management Plans are to be prepared for each of PCA’s network regions by the responsible Regional Asset Manager. PCN employs a functionally based organisational structure, and in a type of “matrix” organisational arrangement, the Regional Asset Managers do not have any direct reports or line management responsibility. Their role however, is to provide a local overview to ensure that the activities of each of the functional units in the regions are properly co-ordinated. This places them in an ideal position to obtain the necessary information from each of the functional groups within their region to complete their Regional Asset Management Plans which will then be the basis of the overall Network Asset Management Plan to be prepared by the Manager Asset Management. In this regard, the Regional Asset Management Plan will be an invaluable management tool for ensuring proper co-ordination of all asset management activities at the grass roots level, and provide a clear annual plan to guide each of the functional groups.

Network Element Plans will also need to draw upon a range of skills and disciplines from within PCN and PCS. Responsibility for their preparation and update has been allocated to technical specialists from within the Asset Strategy and Infrastructure Group.

5.2 Network Asset Management Plans and the Budgeting Process

It was obvious from the earliest stages of development of Network and Regional Asset Management Plans that there was a strong relationship to the normal annual budget development process. In developing the annual budget, it is necessary for all the responsible managers to identify planning, construction and maintenance activities from within their areas of responsibility in order to develop their annual operating and capital expenditure bids. Consequently, much of the content of Network and Regional Asset Management Plans is already developed as part of the normal budgeting process, but simply not pulled together into a single document or is buried deep within budget submissions.

The preparation of Network and Regional Asset Management Plans and the budgeting process is now to be integrated, with the Asset Management Plan forming a very important supporting document to the budget. This relationship is shown in Figure 6 below.

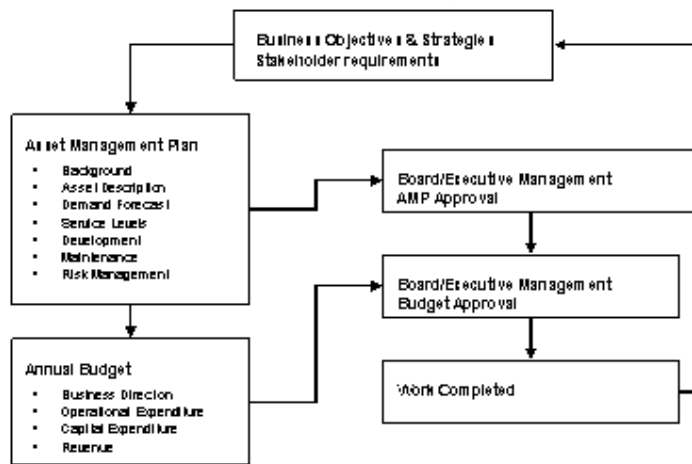


Figure 6. Asset Management Planning and Budgeting Integration

5.3 Stakeholder and Regulatory Scrutiny

The reform of the electricity market in Australia and internationally has brought many changes to distribution network operators. Firstly, the change of ownership from the public to the private (or quasi private) sector has led to greater scrutiny from the media, interest groups and the community as a whole in all aspects of asset management from the planning for assets, their construction, and ongoing operation and maintenance.

Secondly, these industry reforms are often referred to as “de-regulation”. This is only partially true, as while the retail sector can be open to competition (with full retail contestability being introduced on 1 January 2002), the same cannot be said for power distribution network operators like PCA which have a natural monopoly within their network operating areas. Consequently, network operators are in fact subject to greater regulation and scrutiny than previously was the case.

Consequently, PCA took the view in developing AMS and its policy and planning framework that its contents would be available for regulators and the community as a whole to view. (As stated previously, this is already the case in New Zealand, where the preparation and publication of annual network asset management plans is mandatory.)

6 Benefits and Conclusion

6.1 Benefits

There will be a number of benefits from the enhancements, additional policy and reporting framework that PCA has made in developing its Asset Management Strategy Mk 2. These will include:

- Greater focus on meeting corporate, regulatory and other stakeholder objectives for asset management.
- Clearly assigned accountability for Network Asset Management within PCN and PCS.
- Defined performance measures and targets.
- Clearly stated and documented plans and objectives for managing distribution assets so that costs, risks and performance are effectively managed.
- Greater integration and co-ordination between the functional groups within PCA responsible for planning, development, construction and maintenance of PCA’s distribution assets.
- Integration of budgeting and asset management planning processes.

Many other benefits will be realised as AMS2 is further refined in light of experience and use.

6.2 Conclusion

Evolving electricity industry reform and the resulting customer and regulatory requirements are placing ever increasing demands on electrical distribution network asset owners and operators. The continued development of PCA's Asset Management Strategy is a key element in meeting these demands and challenges.

The enhancement of PCA's Asset Management Strategy will ensure that Asset Management practices and objectives focus on meeting the ever increasing and sometimes conflicting demands from all stakeholders for increased levels of service, reduced costs, enhanced risk management and regulatory compliance.

1 Institute of Public Works Engineering Australia (IPWEA), International Infrastructure Management Manual, Australia/New Zealand Edition, Version 1.0, April 200.