Rudall River, WA

Managing Assets for Resource Management and Sustainability
A Discussion Paper

By
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Introduction

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Total asset management will provide the required informed input that will contribute to making the University's budget planning cycle and process more effective. The University's asset management objectives are therefore focused on the following key areas:

- *providing an asset base that matches and supports the business needs of the University;*
- *consolidating existing corporate capital assets and optimising asset utilisation;*
- *meeting its statutory compliance obligations; and*
- *aligning asset operating costs with business planning and service delivery requirements.*

University of Tasmania, Strategic Asset Management Plan 2006 – 2011, version 1.2, November 2005, page 9

Intorduction

Putrajaya Corporation - enhancing its environmental sustainability by reducing the carbon footprint, through the four primary pillars of energy, environment, economy and social perspective

North West Shelf Gas Plant at Night

Making new through simple solutions!

Purpose

The purpose of this paper is to examine the emerging Strategic Asset Management practices and tools, with the view to determining if we individually and collectively can be confident in predicting future outcomes based on today and past actions, with the view to improving intergenerational resource management and sustainability.

Making new through simple solutions!

Approach

- *what is it that we are trying to achieve with respect to intergenerational resource management and sustainability within the framework of Climate Change;*
- *the underlying Operational Asset Management framework that provides data to the Strategic Asset Management practices and tools; and*
- *to provide a specific Carbon accounting and management scenarios that can be used to explain and demonstrate the necessary features of a Strategic Asset Management framework, systems and analyses in the future intergenerational management of resources and sustainability*
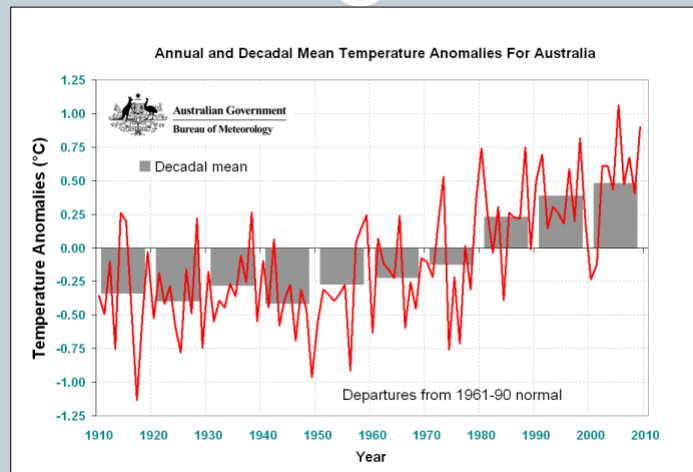
Making new through simple solutions!

Climate Change

- *Variations in global-average temperature over the past century have been measured in the near-surface air, in the lowest 10 km of the atmosphere (the troposphere), and in the ocean. All measurements indicate a long-term warming.*
- *The surface of the Earth has warmed by about 0.74° C since the start of the 20th century. This long-term warming trend is overlaid on short-term fluctuations due to such factors as El Niño and La Niña. Data over the past decade provide little insight into long-term trends; the period is simply too short. Nevertheless, the past decade has been the warmest in the instrumental record.*
- *Sea surface temperatures and ocean heat content for the upper 300m and 700m of the ocean show long-term warming. Global average sea level has risen by 17 cm during the 20th century".*

Australian Department of Climate Change – Hot Topics 'Has Global Warming stopped?'
http://www.climatechange.gov.au/climate-change/~/media/publications/science/hot-topics-globalwarming-v2.ashx
of 5 February 2010

Climate Change

Annual and Decadal Mean Temperature Anomalies For Australia

Climate Change

Full implementation of this Agreement will result in a nationally-compatible, market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes ..

Intergovernmental Agreement on a National Water Initiative, clause 23 'Objective', page 3

Science of Asset Management

Financial Asset Management:

- *Investment management - the sector of the financial services industry that manages collective investment schemes.*
- *Global assets under management*
- *List of asset management firms*
- *Fixed assets management - An accounting process that seeks to track fixed assets for the purposes of financial accounting.*

Science of Asset Management

Physical Asset Management:

- *the practice of managing the whole life cycle (design, construction, commissioning, operating, maintaining, repairing, modifying, replacing and decommissioning/disposal) of physical and infrastructure assets such as structures, production and service plant, power, water and waste treatment facilities, distribution networks, transport systems, buildings and other physical assets. Infrastructure Asset Management expands on this theme in relation primarily to public sector, utilities, property and transport systems.*

Science of Asset Management

Enterprise Asset Management:

- *the business processes and enabling information systems that support management of an organisation's assets, both physical (such as buildings, equipment, infrastructure etc) and non-physical such as:*

- *IT asset management - the set of business practices that join financial, contractual and inventory functions to support life cycle management and strategic decision making for the IT environment. This is also one of the processes defined within IT Service Management.*

- *Digital asset management – A form of electronic media content management that includes digital assets.*

Science of Asset Management

Systematic Asset Management:

- the *holistic process of managing assets and the inter-relationships between them and between the assets and the community. This process occurs within a framework for asset lifecycle optimisation in order to ensure the resultant services will continue to enhance the community's quality of life, while maintaining urban sustainability.*

K.C. Leong, The Essence of Asset Management – A Guide, page 38
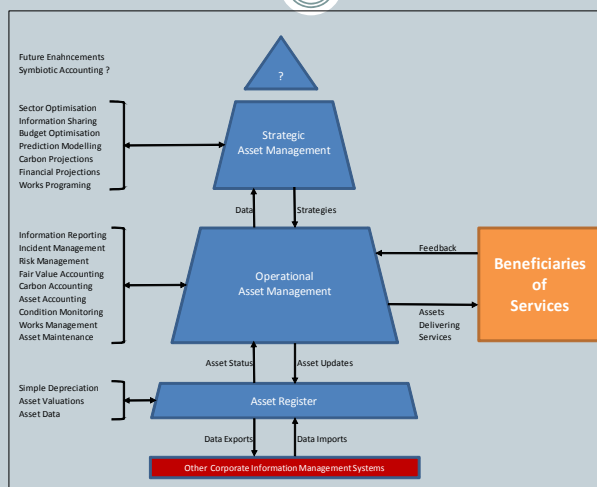
Science of Asset Management

The defining characteristic of asset management is not how it is defined but in how it is applied.

Hamersleyensis
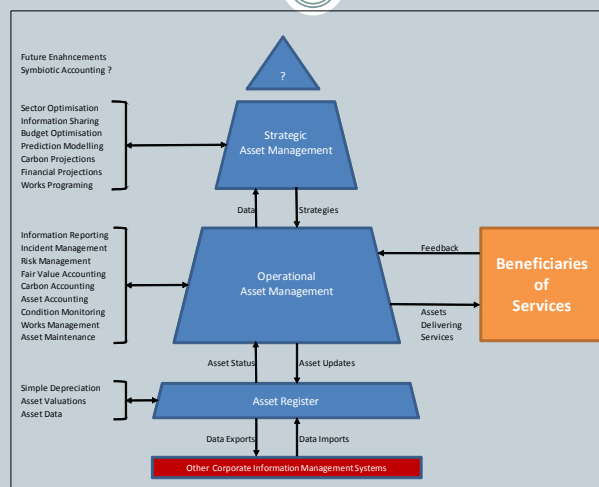

Science of Asset Management

Science of Asset Management

The Swan River Trust is currently seeking an asset management system to help it manage the

- *naturally, vegetated shorelines – both existing natural bushland and planted shorelines to promote shoreline stability and prevent erosion. Types vary but include trees, shrubs and grasslands.*
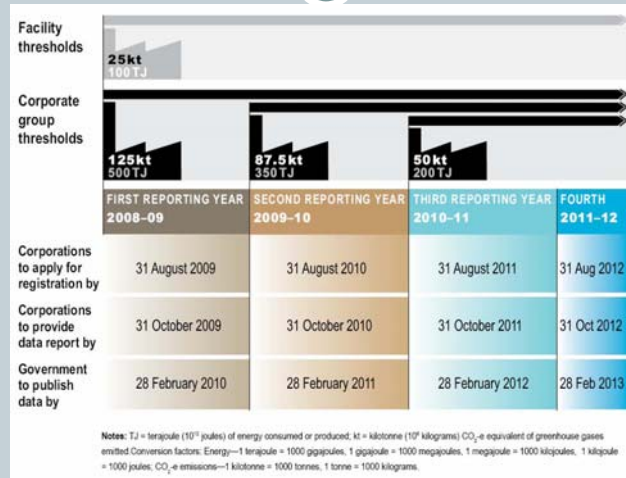
Swan River Trust, 45809 Request DEC Asset Management System for Swan River Trust, page24

Science of Asset Management

Carbon Accounting and Management

	FIRST REPORTING YEAR 2008–09	SECOND REPORTING YEAR 2009–10	THIRD REPORTING YEAR 2010–11	FOURTH 2011–12
Facility thresholds	25kt / 100 TJ			
Corporate group thresholds	125kt / 500 TJ	87.5kt / 350 TJ	50kt / 200 TJ	
Corporations to apply for registration by	31 August 2009	31 August 2010	31 August 2011	31 Aug 2012
Corporations to provide data report by	31 October 2009	31 October 2010	31 October 2011	31 Oct 2012
Government to publish data by	28 February 2010	28 February 2011	28 February 2012	28 Feb 2013

Notes: TJ = terajoule (10^{12} joules) of energy consumed or produced; kt = kilotonne (10^6 kilograms) CO_2-e equivalent of greenhouse gases emitted. Conversion factors: Energy—1 terajoule = 1000 gigajoules, 1 gigajoule = 1000 megajoules, 1 megajoule = 1000 kilojoules, 1 kilojoule = 1000 joules; CO_2-e emissions—1 kilotonne = 1000 tonnes, 1 tonne = 1000 kilograms.

Carbon Accounting and Management

A company's investment in measurement of its carbon footprint can serve multiple goals. When greenhouse gas emissions are measured and reported, they are generally better managed.

Best practice also requires that an organisation make transparent to the public steps taken to measure, reduce and offset emissions so that any carbon neutral claims can be objectively assessed.

National Carbon Offset Standard

Carbon Accounting and Management

The Standard specifies:

- *the types of carbon offsets that constitute genuine, additional emissions reductions in the context of the CPRS;*
- *the general principles and requirements for calculating the carbon footprint of a product or organisation;*
- *requirements for transparent recording of the carbon footprint, measures taken to reduce emissions and the amount reduced and the emissions amount offset and the type of carbon offsets purchased and retired; and*
- *requirements for auditing the veracity of carbon footprint calculations and offset claims.* "

National Carbon Offset Standard

NGERS Calculator

- ***Scope 1 emissions****: The release of greenhouse gas into the atmosphere as a direct result of activities at a Facility.*
- ***Scope 2 emissions****: The release of greenhouse gas as a result of electricity generation, heating, cooling or steam that is consumed by a Facility.*
- ***Scope 3 emissions****: The release of greenhouse gas into the atmosphere that is generated in the wider economy as a consequence of a facility's activities but that are physically produced by another Facility.*

National Carbon Offset Standard

NGERS Calculator

- **Method 1** – *using default emissions factors derived from the latest version of the National Greenhouse Account Factors;*
- **Method 2** – *a method using industry sampling and Australian or international standards listed in the NGER (Measurement) Determination or equivalent for analysis;*
- **Method 3** – *a method using Australian or international standards listed in the Determination or equivalent standards for both sampling and analysis of fuels and raw materials. Method 3 is very similar to method 2, but it requires compliance with Australian or equivalent documentary standards for sampling; and*
- **Method 4** – *direct measurement using continuous or periodic emissions monitoring.*

National Carbon Offset Standard
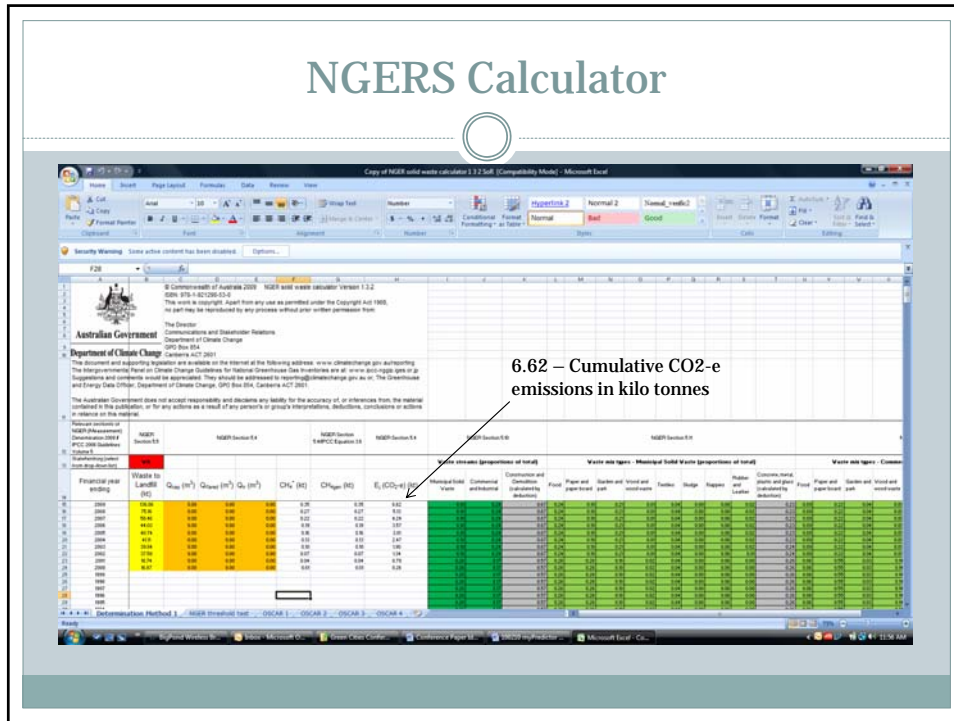

NGERS Calculator

Prepare a greenhouse gas emissions inventory report, which contains the following components:

- *the organisation boundary;*
- *greenhouse gas emissions sources associated with the organisation boundary;*
- *greenhouse gas emissions factors and calculation methodology;*
- *activity and emissions data collected;*
- *assumptions used;*
- *all exclusions and their justification; and*
- *final calculated greenhouse gas emissions attributable to the organisation boundary.*

National Carbon Offset Standard

NGERS Calculator

- *Method 1 – using default emissions factors derived from the latest version of the National Greenhouse Account Factors*

NGERS Calculator

11.92 – Cumulative CO2-e emissions in kilo tonnes

NGERS Calculator

6.62 – Cumulative CO2-e emissions in kilo tonnes

NGERS Calculator

Waste mix by Waste Stream

Type	NSW %	Vic %	Qld %	WA %	SA %	Tas %	ACT %	NT %
MSW	31	36	43	26	36	57	43	43
C&I	42	24	14	17	19	33	42	14
C&D	27	40	43	57	45	10	15	43

NGERS Calculator

Waste mix by Waste Type

Waste Mix	MWS %	C&I %	C&D %
Food	26	6	-
Paper/paperboard	26	55	3
Gardens	10	3	2
Wood/woodwaste	2	14	6
Textile	4	2	-
Sludge	-	3	-
Nappies	6	-	-
Rubber/Leather	-	1	-
Concrete/Metal/Plastic/Glass	26	16	89

Operational Asset Management
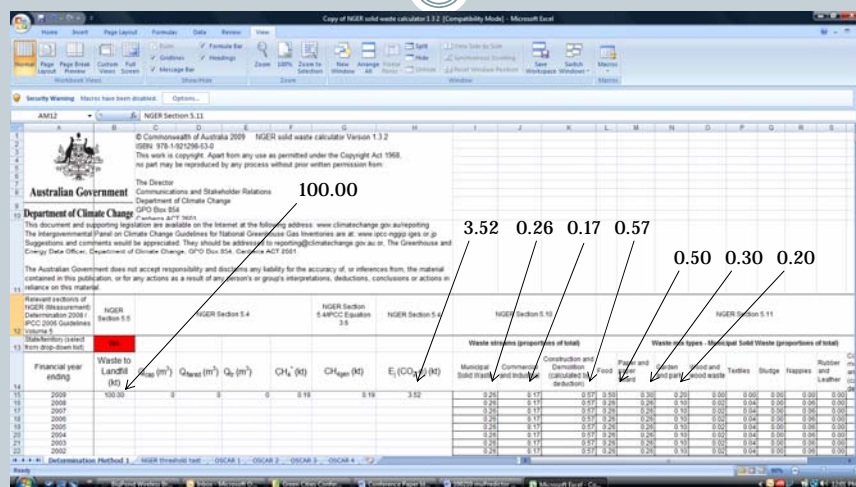
Operational Asset Management
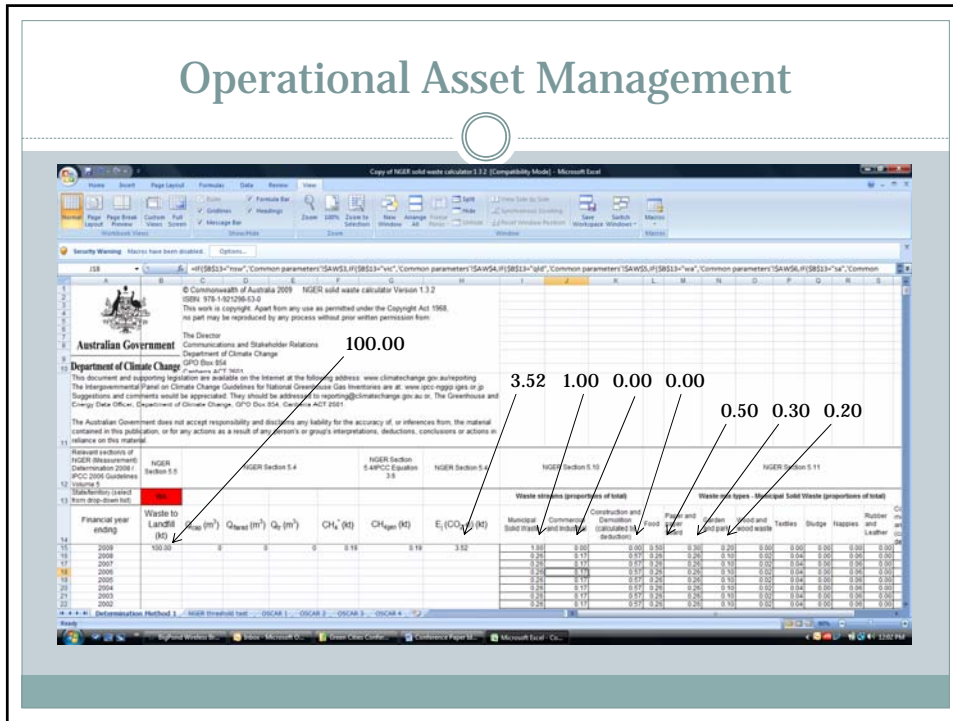
Operational Asset Management

Strategic Asset Management

- *The objective of Strategic Asset Management is to empower uses of this capability to analyse operational data and information within the context of holistic, predictive, scenario and comparative (or benchmark) modelling to develop informed or knowledgeable solutions with respect to systems of assets down to, and inclusive of specific assets within the system.*
- *Strategic asset Management also provides the confidence necessary to invest and implement structured change to asset use, operation and maintenance.*

Strategic Asset Management

Introductory comments:
- Shoot the Corporate Accountant
- Shoot the Corporate Engineer
- Keep the analysis simple using a few key performance indicators, preferable those which are quantitative in nature

Strategic Asset Management

Strategic Asset Management

Strategic Asset Management

Introductory comments:

- Shoot the Corporate Accountant
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- Keep the analysis simple using a few key performance indicators, preferable those which are quantitative in nature
- Model the outcome to meet the reporting requirement

Strategic Asset Management
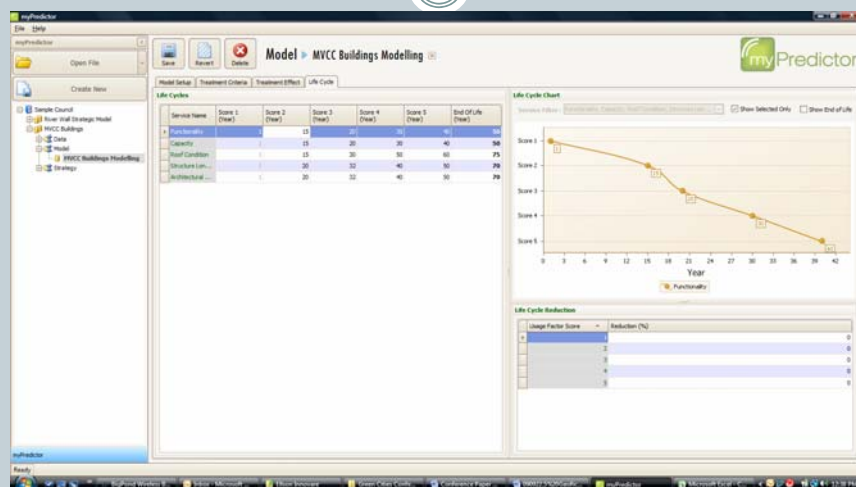
Strategic Asset Management

Some rules for modelling Sustainability:

- Sustainability is a function of 1) design and technology, 2) use and operation and last 3) maintenance and treatment.
- Sustainability analysis/modelling assumes a baseline.
- Sustainability analysis/modelling are undertaken on three basic scenarios:
  - Do nothing
  - Do something now within the constraints of a project
  - Do something progressively within the constraints of normal work practices
- The introduction of currency ($$) early in the sustainability analysis/modelling process introduces too many unwanted and unnecessary variables.
- Sustainability analysis/modelling and reporting should align to government requirements to the most practical extent possible.

Strategic Asset Management

Year	1	2	3	4	5
Revenue					
Receivals - RDF					
7 Mile	6,570,994	7,387,112	8,304,591	9,336,021	10,495,555
Tom Price	1,293,166	1,387,697	1,489,137	1,597,993	1,714,806
Newman	1,756,900	1,885,329	2,023,147	2,171,039	2,329,742
South Hedland	3,091,119	3,317,080	3,559,558	3,819,762	4,099,987
Subtotal	12,712,179	13,977,217	15,376,433	16,924,815	18,639,989
Sales					
Electricity	5,499,664	6,044,394	6,646,669	7,312,896	8,050,224
Heat	0	0	0	0	0
Subtotal	5,499,664	6,044,394	6,646,669	7,312,896	8,050,224
Total Revenue	18,211,842	20,021,612	22,023,102	24,237,711	26,689,313
Landfill of Residual	337,065	370,608	407,708	448,764	494,218
Net Revenue	17,874,777	19,651,003	21,615,394	23,788,947	26,195,095
Operating Costs					
Labour	3,880,500	3,965,871	4,053,120	4,142,289	4,233,419
Operating Costs	6,459,843	6,601,959	6,747,202	6,895,641	7,047,345
Other Plant	160,000	163,520	167,117	170,794	174,551
Site Maintenance	80,000	81,760	83,559	85,397	87,276
Insurance Costs	210,000	214,620	219,342	224,167	229,099
Depreciation	7,423,148	7,423,148	7,423,148	7,423,148	8,219,388
Interest on Borrowings	2,844,284	2,844,284	2,844,284	2,844,284	2,047,444
Other Operating Expenses	28,891	29,527	30,177	30,840	31,519
Accounting and Legal	200,000	204,400	208,897	213,493	218,189
Total Costs	21,286,666	21,529,089	21,776,845	22,030,052	22,288,830
Profit or Loss	-3,411,889	-1,878,085	-161,452	1,758,894	3,906,265
Cash Flow	-3,411,889	-5,289,974	-5,451,426	-3,692,531	213,733

Treatment	Annual Scope 1 Emission CO2-e (t)	Annual Scope 2 Emission CO2-e (t)	Annual Scope 2 Emission CO2-e (t)	Annual Energy Consumption (J)	Annual Energy Produced (J)
Do Nothing	1.05	1.05	1	1.05	1
Maintenance	1	1	1	1	1
Enhancement	0.95	0.95	1	0.95	1
Renewal	0.75	0.75	1	0.75	1
Replacement	0.5	0.5	0.95	0.5	1

Strategic Asset Management

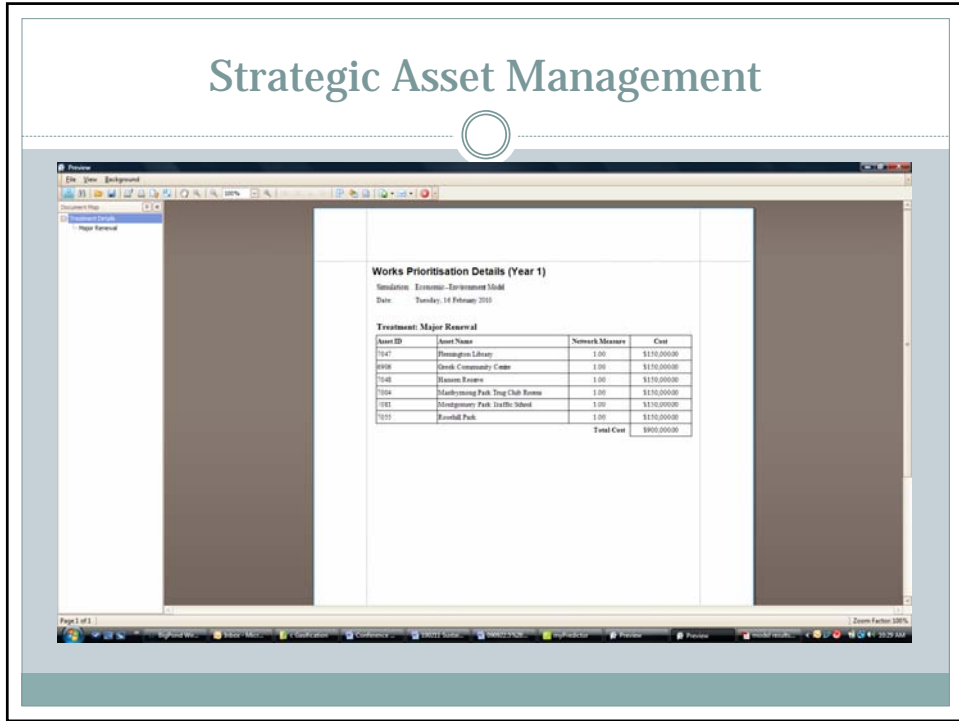| Year	Treatment	S1e	S2e	S3e	E consump	E prod
	Baseline	25.000	10.000	2.000	8000.000	0.000
1	nothing	26.250	10.500	2.000	8400.000	0.000
2	maint	26.250	10.500	2.000	8400.000	0.000
3	nothing	27.563	11.025	2.000	8820.000	0.000
4	Enhancement	26.18438	10.47375	2	8379	0
5	nothing	27.49359	10.99744	2	8797.95	0
6	maint	27.49359	10.99744	2	8797.95	0
7	nothing	28.86827	11.54731	2	9237.8475	0
8	Renew	21.65121	8.660482	2	6928.3856	0
9	nothing	22.73377	9.093506	2	7274.8049	0
10	maint	22.73377	9.093506	2	7274.8049	0
11	nothing	23.87045	9.548181	2	7638.5452	0
12	enhancement	22.67693	9.070772	2	7256.6179	0
13	nothing	23.81078	9.524311	2	7619.4488	0
14	maint	23.81078	9.524311	2	7619.4488	0
15	nothing	25.00132	10.00053	2	8000.4212	0
16	replace	12.50066	5.000263	1.9	4000.2106	0
	Net Improve	12.499	5.000	0.100	3999.789	0.000

Strategic Asset Management

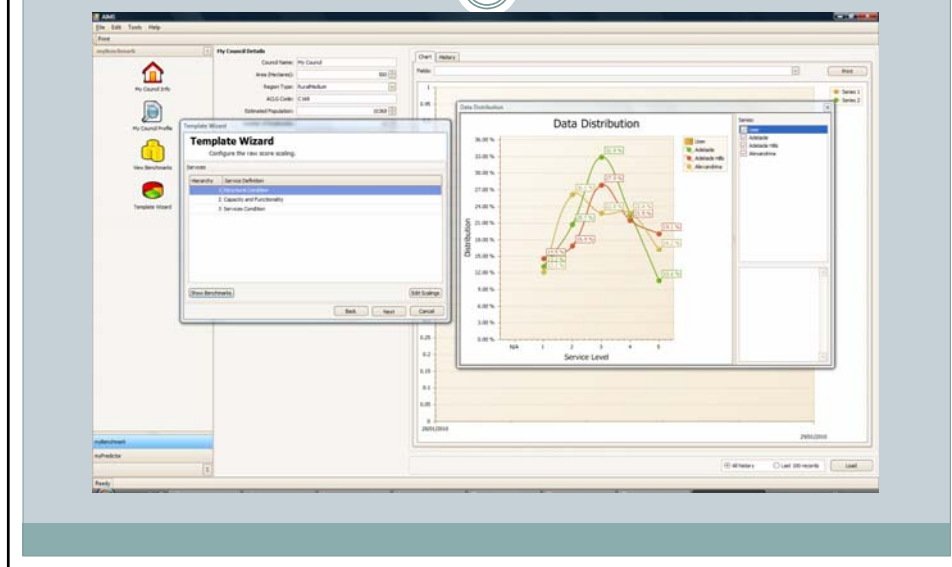# Strategic Asset Management

Strategic Asset Management

Strategic Asset Management

Strategic Asset Management

Strategic Asset Management

Strategic Asset Management

Modelling at a strategic level :

- *is based on data collected at the operational level and the quality of modelling analyses and outputs id dependent on the quality of data used to populate the model;*
- *is used to build confidence with respect to the development and implementation of asset management strategies; and*
- *modelling does not replace human decision making – it aids the process of making decisions.*
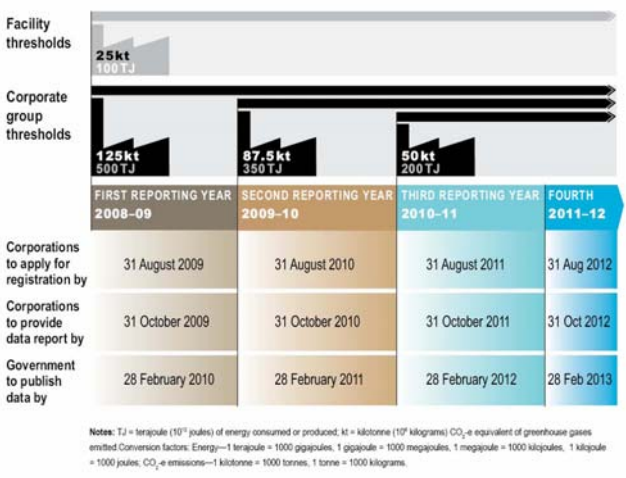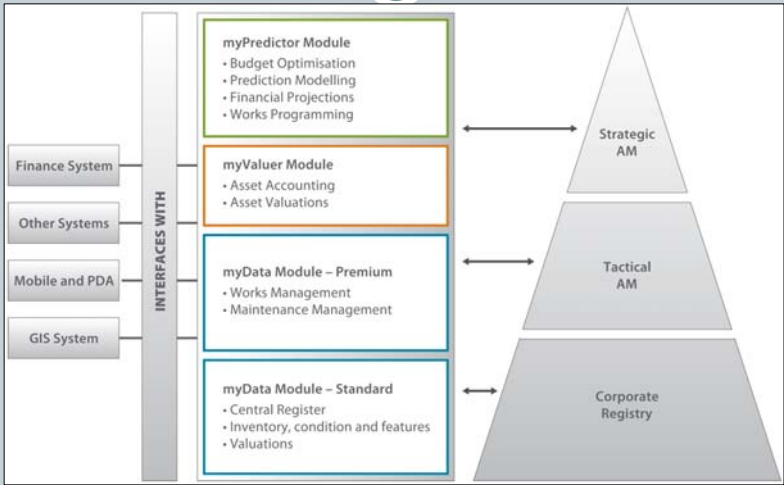
Strategic Risk Management

The Corporate Accountant

Concluding Remarks

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Concluding Remarks

Improving intergenerational resource management and sustainability will be achieved through the application of strategic asset management, with the purposeful intent of:

- *information sharing and benchmarking to identify the most successful course of actions or scenarios being adopted by peer and other organisations;*

- *tailoring predicative models to specific corporate service(s) delivery scenarios based on monetary costs and Carbon emissions out as far as possible but in doing so noting the decreasing level of accuracy;*

- *developing appropriate asset management strategies to support the delivery of services; and*

- *monitoring the implementation of the asset management strategies whilst implemented and refining the strategies as appropriate based on results and other feedback.*