

THE CABINET OFFICE
NEW SOUTH WALES

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Dear Mr Banks

I am writing in regard to the Productivity Commission's *Improving the Future Performance of Buildings* study.

I am pleased to forward the NSW Government's submission, which has been prepared by the NSW Department of Public Works and Services in conjunction with the Ministry of Energy and Utilities, the Sustainable Energy Development Authority, the Environment Protection Authority and the Department of Urban Affairs and Planning.

Yours sincerely

R B Wilkins
Director General

NSW GOVERNMENT SUBMISSION
to
THE PRODUCTIVITY COMMISSION
RESEARCH STUDY
on
IMPROVING THE FUTURE PERFORMANCE OF
BUILDINGS

THE SUBMISSION

This submission responds to the Issues Paper, *Improving the Future Performance of Buildings*, in which the Productivity Commission seeks information regarding the use of building performance measures and input saving technologies.

In addressing the issues raised the submission outlines overarching policies and areas of regulation that impact on the performance of buildings. The management of government physical assets is guided by:

- *Total Asset Management (TAM) Manual and Guidelines*
- *Construction Industry Policy and Initiatives*
- *Government Energy Management Policy (GEMP)* and related initiatives
- *Building Code of Australia (BCA)* and *Environmental Protection and Assessment (EP&A) Act and Regulation*

The submission includes comments on input saving technology practice by a range of government authorities and units.

TOTAL ASSET MANAGEMENT

The NSW Government owns assets and infrastructure valued at \$1 OOB. In 1992 the NSW Government introduced the concept of Total Asset Management (TAM) to provide a structured and systematic resource allocation approach to infrastructure and physical asset management so that resources are aligned with the service objectives of agencies. A fundamental tenet underlying TAM is the need to ensure that resources are used as effectively and efficiently as possible.

There are some guidance modules in the TAM Manual that are relevant to this Productivity Commission research study:

- Performance Monitoring
 - Post Implementation Review
 - Asset Utilisation and Performance (currently in development)
 - Asset Registers
 - Asset Valuation (currently in development)
 - Asset Capitalisation (currently in development)
- Key Issues
 - Sustainable Development
 - Heritage Asset Management
 - Private Sector Participation in Public Infrastructure
 - Demand Management Life cycle Costing
- Decision Tools

- Economic Appraisal
- Value Management
- Risk Management

A copy of the TAM Manual can be accessed through the Internet at <http://www.dpws.nsw.gov.au/gamc/pdfs/tam.htm>.

Agencies are required to develop Maintenance, Capital Investment, Disposal, and Accommodation Plans that are concurrent and form a Total Asset Management strategy as part of the Budget Process. This has required the development of a new management culture. Aspects of current practice that are being developed as required are:

- Measurement and reporting the performance of agencies' portfolios in terms of asset efficiency
- Wider and better use of planning tools to support the development of more effective asset development and implementation. Government Selected Application Systems (GSAS) is currently reviewing systems already in existence, owned by NSW Government agencies.

Some of the specific TAM guidelines that help assessment of building performance are:

- 1 The TAM Manual Performance Monitoring guideline *Post Implementation Review* which requires agencies to measure two aspects of any project, namely:
 - whether what was sought was obtained
 - whether what was sought was what was needed.
 In this context, a project could include an asset construction or maintenance project. Measures from such a review are suitable for amending future asset development.
- 2 The TAM Manual will soon contain a guideline on *Asset Utilisation and Performance*. The value of an asset is measured in terms of how well it supports the delivery of the service for which it was built and how efficiently it provided that support. For example, measures for service support could be the number of health procedures or units of education accommodated or applications processed while efficiency of support might be square metres of building per staff or kilowatt hours per square metre of floor space.

Agencies are being encouraged to develop a range of composite measures that relate service outcomes to the asset accommodating it. Typical of such measures might be kWh per student hour of laboratory use, or \$ per year of maintenance per youth in custody. Such measures are currently at a very early stage of implementation
- 3 Agencies are also placing more significance on the environmental aspects of building performance in asset management decisions.

The TAM Manual contains a detailed guideline on *Sustainable*

Development, which requires agencies to consider economic, ecological and social sustainability in any asset decisions. However, in times of ongoing economic restraint agencies may tend to consider an economic case of more value than a case based also on social and ecological issues. Were such issues to become core to the way agencies were required to provide services, it is likely that they would figure more highly in asset decision making.

Life Cycle Costing (LCC) analysis

LCC is one of the key issues to be considered as part of NSW Total Asset Management procedures (refer to section on Total Asset Management).

LCC analysis is used routinely at design stage by for example, DPWS Building Design Services, where alternative design solutions are compared over the life of the building. The analysis is applied to particular elements such as facade systems or building services systems that may have innovative aspects and where cost benefits may be realised over time. Information is used to support design development decisions at client design reviews. LCC is not feasible for whole-of building options comparison in the design process because of the detailed information input required for meaningful results. Clients are also often reluctant to commit additional fees or time for full LCC analysis.

In tender evaluation, however, LCC principles have been used to compare widely different designs. In design and construct tenders where materials, quantities, and form differ between different tenderers' solutions the comparison has to include LCC. The LCC results are weighted so that they can be aggregated with other criteria to determine the preferred tender.

Designing to achieve a known capital allowance and achieve the optimum whole-of-life costs, means LCC is a very important design process component. If the capital allowance is not met, the project may not go ahead. If the ongoing costs are excessive, the client may be forced to reduce services etc to achieve this operating budget. LCC assists in predicting the operating budget and setting the right performance goal.

Stakeholders with a long term interest in a project are most likely to use LCC analysis. In this respect, BOOT (Build Own Operate and Transfer) type projects and the like are particularly relevant. Other stakeholders include those whose operating budget is fixed and is large in comparison with their manufacturing income, such as:

- Schools, which have no manufacturing income from their facilities - so it is important that operating costs are kept to a minimum
- At the other end of the spectrum, factories may have large income streams and can more easily accommodate operating costs

The chain of custody, one stakeholder to the next, may clearly impede the application of LCC analysis. Commercial buildings may be designed and built by one stakeholder, passed on to a funding institution to manage and then relet or leased. The failure of the end user to have input into the design process is an impediment to the use of LCC.

Further, the refurbishment of commercial buildings on a ten-year basis due to technological advances will mean that a lot of long term costing is irrelevant, as the life cycle of materials (partitions, carpets, lighting, etc.) will not reach their replacement date.

Other methodologies can have more relevance to commercial buildings from some perspectives. Office occupancy cycles differ to construction cycles. Vacancy rates will determine the value of a property rather than the costs of creating that property. Such that an office block may be revalued below its original purchase price due to the inability to let most of the space. Space use and flexibility of design are more relevant combined with energy requirements - so that part of the building could be optimised by using LCC (services) while other parts may relate to costs to refurbish or relocate staff/offices etc.

The Crown Property Portfolio

The Department of Public Works & Services (DPWS) Services manages the Crown Property Portfolio (CPP) using TAM principles on behalf of the Treasury. CPP is a mix of government owned and government leased buildings occupied in the main by government agencies. In 1998/99 the CPP consisted of:

- 33 owned buildings housing 194 tenancies in 106,263M2 of office space
- 36 leased buildings housing 150 tenancies in 203,032M2 of office space

The major building performance areas measured by DPWS are:

- Building efficiency - net lettable area v gross lettable area.
- Efficiency of lettable area - current target of 18M2per person with a future target of 15M2per person.
- Measurement of cleaning, energy and building management costs - benchmarking individual buildings against the portfolio and against Property Council of Australia (PCA data). These three outgoings represent in excess of 60% of all operating expenses.
- Financial performances using discounted cashflows. Nett Present Values (NPVs) and Internal Rates of Return (IRRs) are produced for owned buildings each year and NPVs for leased buildings. The results are compared against predetermined estimates of desired returns.
- Tenant satisfaction levels and retention indicators.

Performance measures used to evaluate buildings include:

- Monthly analysis of variations in gross income and gross expenditure;
- Actual v budget net income;
- Monthly analysis of capital expenditure on owned buildings;
- Actual v budget capital expenditure;
- Monthly aged debt trends;

- Monthly vacancy trends;
- Vacancy measured against the market;
- Monthly performance of the CPP's cleaning, energy and building management costs; and
- Comparison of cleaning, energy and building management costs against the PCA Building Operating Profiles.

Energy and water consumption is measured in all owned buildings in the portfolio. With new systems recently purchased, DPWS will be analysing expenditure in considerable more detail this financial year, 1999-2000, comparing the performance of every owned building on the basis of a rate per m², and categorising buildings into heritage, CBD and country.

DPWS has also undertaken measures to reduce water consumption. This has resulted in major savings in water consumption; eg. savings of up to 60% have been achieved in one building from the installation of urinal control devices.

The details of the DPWS program for improving energy efficiency are included in the "Energy Management" section below.

CONSTRUCTION INDUSTRY POLICY AND INITIATIVES

Each year the NSW Government spends \$613 on construction. As the largest single client, the New South Wales Government is using its buying power as a lever to facilitate change within the Construction Industry. Purchasing power is being focused by the adoption of consistent capital investment, building construction, and contractual policies across all agencies and the establishment of requirements to be met by industry wishing to do business with the Government.

The Government's white paper, Construct NSW, which was released in July 1998, provides a detailed framework to achieve the Government's goals for the industry (details can be accessed through the Internet at <http://www.cpssc.nsw.gov.au/ConstructNSW/index.htm>).

Most relevant to this Productivity Commission study is Strategy 16 - *Mainstreaming an ecologically sustainable industry*. Under this strategy, the NSW Government will encourage the construction industry to proactively manage environmental issues, which will lead to the industry being recognised for its high ESD performance by both clients and the wider community.

The strategy is supported by eight specific actions:

- Making Ecologically Sustainable Development meaningful to the construction industry
- Establish environmental best practice on government projects
- Require Environmental Management System accreditation of contractors on government projects
- Audit Environmental Management Plans on government projects
- Require reporting on environmental performance on government projects

- Publish waste minimisation strategies for government construction projects
- Pilot recycling and reuse on government construction projects
- Support effective use of scarce resources

Environmental Management Systems Guidelines

Initial implementation of these actions began with the release of the *Environmental Management Systems Guidelines* developed by the Government's Construction Policy Steering Committee in November 1998 (available on the Internet at <http://www.cpsc.nsw.gov.au/policies.htm>). The guidelines are aimed at providing a systematic approach to the management of the environmental impacts of the construction industry within the context of the principles of Ecologically Sustainable Development.

Under the guidelines, all NSW Government projects that go to tender require an environmental management plan for the project to be produced by the successful contractor.

An environmental management plan is a site-specific plan developed to ensure that all contractors and sub-contractors comply with the environmental requirements of the project and that the environmental risks are properly managed. Actual performance will be audited against the plan and included in contractor performance reports.

For major projects, tenders will only be accepted from contractors that have registered their corporate Environmental Management System with the construction agencies.

An Environmental Management System comprises those elements of an organisation's overall management that ensure that environmental issues are identified and properly managed. A crucial outcome required of the system is demonstrated continual improvement of the organisation's environmental performance.

A major project has been defined as one whose value is \$10 million and above or work that is environmentally sensitive. The \$10 million threshold will capture projects such as the construction of a new High School, TAFE College, 600 metre 2 lane concrete bridge or approximately 6 kilometres of rural highway. It is anticipated that the \$10 million threshold will be lowered as the implementation of this initiative is reviewed.

Environmental Best Practice

DPWS is developing an environmental best practice guideline. The guideline will assist users on two levels; one as a simple design phase strategy guide and the other as a built environment performance rating tool. High level environmental performance indicators are being developed. It is expected that data sourcing will be by questionnaire processes.

Corporate Environmental Reporting

The EPA addresses some of the issues in their document *Corporate Environmental Reporting, Why and How* (EPA, October 1997). While not specifically addressing the construction industry this generic document contains guidance on how to quantify and assess a range of environmental performance indicators (including water consumption, energy

consumption, and greenhouse gas production). Significantly, low-impact organisations are encouraged to consider reporting on environmental performance, because they have direct environmental impacts through, at a minimum: water and energy use; resource consumption (including paper);

- waste production; and
- transport use in work hours and by staff commuting to work

Waste Management

The EPA administers several NSW Government policies that seek to foster waste minimisation in the construction and occupation of buildings:

- the Construction and Demolition Waste Action Plan, and
- the NSW Government Waste Reduction and Purchasing Policy.

Construction and Demolition Waste Action Plan

The Waste Action Plan identifies thirty-four implementation actions for reduction of waste at project design, construction, and demolition stages. These actions identify roles and responsibilities for all sectors, including government, industry members, and the community. The plan represents a series of recommendations to focus the efforts of key groups on the challenge of reducing construction and demolition waste. The Environment Protection Authority reports annually on construction and demolition industry waste reduction to the State Waste Advisory Council.

Waste Reduction and Purchasing Policy

The Waste Reduction and Purchasing Policy involves NSW Government Agencies developing a plan to monitor and manage its waste. The plan, which is lodged with the EPA, focuses on paper products, office equipment, landscaping and construction materials. Agencies are to plan and implement a strategy to avoid unnecessary use, reduce waste, recycle where possible and follow a purchasing code that does not discriminate against recycled materials. Agencies are required to regularly report their progress to the EPA who will aggregate the reports into its State of the Environment report.

Environment Protection Authority: <http://www.epa.nsw.gov.au>

ENERGY MANAGEMENT

In August 1996, the Premier of NSW set energy reduction targets for government agencies:

- 15% reduction from the 95/96 level by 2001
- 25% reduction from the 95/96 level by 2005.

Government Energy Management and Reporting

Under the Government Energy Management Policy (GEMP) which was introduced in 1998, government agencies are required to "monitor performance by regularly recording, analysing and monitoring all the agency's energy consumption (quantities and costs), as part of managing energy use".

For buildings, agencies are monitoring energy consumption by collecting data, and establishing performance indicators such as energy utilisation indices (EUI), for example megajoules per net lettable area per year.

In addition to this improved energy management by agencies, agency aggregated energy data (including total consumption and EU1s) will be collated by the Ministry of Energy and Utilities. The first annual report of the consolidated picture is expected to be prepared at the end of 1999.

GEMP implementation plan is available from the Internet at:
<http://www.doe.nsw.gov.au/generai/gemp/final.pdf>

Energy Smart Government Program.

The Energy Smart Government program was launched in August 1996. The program is designed to assist government agencies reach the Premier's energy reduction targets.

The aim of the program is to encourage agencies to invest in cost effective energy efficiency projects. The capital investment in these projects has ranged from modest projects of a few hundred dollars to multi million dollar projects. The current trend is to acquire the capital for these projects from other sources such as Treasury through Energy Performance Contracts (EPCs).

Treasury has invested \$20 million into energy cost reduction projects that are guaranteed by EPC companies. This has made a huge difference to agencies as they have a new funding stream for energy efficiency projects.

Partners in the Energy Smart Government program signed a Memorandum of Understanding thereby agreeing to reduce greenhouse gas emissions by implementing cost-effective energy efficiency upgrades in their buildings over a seven year period.

Sustainable Energy Development Authority (SEDA) provides a range of services to partners including an Implementation Management Team, technical engineering advice, energy product vendor information, guidance on contacts for upgrades and access to funding through Treasury for EPCs.

The following agencies are partners in the Energy Smart Government Program.

Attorney General's Department	Integral Energy
Department of Corrective Services	Johnson Controls
Department of Education and Training	North Power
Department of Energy	NSW Health Department
Department of Mineral Resources	NSW Police Service
Department of Public Works and Services	NSW Environment Protection Authority
Department of State and Regional Development	State Forests
Department of Transport	State Library of NSW
Energy Australia	State Rail Authority of NSW
	Treasury

As at September 1998 energy savings of over \$10,000,000 p.a. have been identified with over \$1,700,000 p.a. already realised.

Some of these projects include:

Partner	Project	C02 Emissions Saves (T.p.a.)	\$ Savings p.a.	Internal Rate of Return (%)
Department of Corrective Services	Goulburn and Cessnock Facility upgrade	1,166	112,000	63
Department of Health (Macquarie)	AHS Boiler Conversion	2,160	130,000	25
NSW Police Service	Avery Building lighting upgrade	1,256	110,000	68
Department of Health	Westmead Hospital A/C upgrade	2,746	200,000	55

Energy Smart Government Program:
<http://www.seda.nsw.gov.au/government/smartb.html>

Energy Management within the Crown Property Portfolio

An active program of improving the energy efficiency has resulted in savings in equivalent greenhouse gas emissions due to lower consumption of electricity, gas and oil.

Energy consumption of all owned buildings is continually monitored within the portfolio. A review of overall energy consumption compared to historical records is carried out yearly.

New energy saving systems have recently been installed in some of the buildings, their performance will be monitored over the coming years to determine if the energy savings live up to the claims. Where savings are realised then the technology will be extended to other buildings as appropriate. All projects that entail potential energy savings require an analysis on the economic benefit of the project. The Internal Rate of return (IRR) method is generally used for this analysis.

Regarding the current use of input saving technologies (IST), the energy efficiency of existing buildings is benchmarked against the Property Council of Australia guidelines, where consumption is measured in megajoules per square metre of net lettable area.

DPWS has adopted a broad range of input saving technology measures in a number of buildings that are then monitored to measure successes. Where successful, DPWS will extend the use of these measures to appropriate buildings where applicable, on cost-effectiveness grounds only.

In regard to impediments to IST uptake, DPWS has found that in the case of leased buildings there is generally no incentive in the lease documents for the owner to improve the energy efficiency of a building. For a tenant there is limited potential, such as lighting upgrades and the use of "green" computers and other equipment. The tenant in turn may not feel justified in spending capital funds on a building in which they do not have any long term financial commitment.

Building Greenhouse Rating Scheme - Sustainable Energy Development Authority (SEDA)

SEDA has developed a voluntary star rating scheme for commercial buildings to stimulate market demand for improved cost, energy and greenhouse performance.

Commercial buildings are recognised to contribute a significant proportion of national greenhouse emissions. Under a business as usual scenario, emissions from the commercial building sector are expected to double over 1990 levels by the year 2010. Government and business recognise that improvements need to be achieved. The Federal Government is considering a mandatory standard, while industry would prefer a voluntary response.

SEDA's Building Greenhouse Rating (BGR) Scheme, which will be piloted in NSW for office buildings is market based, aiming to provide a clear market signal about the performance of buildings. This will allow building owners and tenants to benchmark their buildings performance and good performers to differentiate themselves in the market place.

SEDA's longer term objective, in cooperation with other states and federal government agencies and private organisations, is to establish the scheme nationally incorporating all non-residential buildings types. SEDA will also pass on administration of the scheme to an appropriate organisation, once established and self funding.

The scheme was developed following a review of building rating initiatives around the world. The failure of many schemes was found to be the reliance placed on the simulated performance of a building. Often there is little or no correlation between the simulated performance and the actual performance of building, and many cases of buildings that performed well in simulation but showed poor actual performance. The simulation approach also requires a high level of information on building design and installed equipment.

In contrast, the BGR scheme is performance based, using actual energy consumption information. This approach is simpler and uses readily available information. It also provides the most flexibility for building owners and tenants to achieve improvements and is not locked into one type of technology or design, thereby catering for innovation.

The BGR Scheme incorporates a mechanism to rate buildings in the proposal or design stage. This design rating is commitment based. A building developer can use the rating to market their building at an early stage but must commit to achieving that rating when the building is in operation.

The rating is based on greenhouse emissions rather than energy. A greenhouse rating allows flexibility of fuel switching as well as technology improvements to improve a building's rating. The greenhouse rating is outcome focussed and it compliments other initiatives under the

National Greenhouse Strategy. An important component of the scheme is communicating the linkages between design, cost, energy consumption and greenhouse gas emissions.

During its conception it was recognised that for the scheme to be successful it will require wide support and acceptance of both government and private organisations. To achieve this, SEDA established a steering committee and industry advisory committee to ensure wide consensus on design and implementation. This will be supported by a marketing campaign to establish the scheme in the market place.

The scheme was launched on 2 September 1999 for NSW office buildings. The scheme has strong endorsement of key industry players, including the Property Council of Australia, the Master Builders Association and The Royal Australian Institute of Architects.

In addition, DPWS have committed to:

- Rating the entire Crown Property Portfolio by the end of the year and the results will be made available to SEDA for public distribution, and
- Improving the average performance rating of the Crown Property Portfolio by an average one star by 2005.

Transport Energy

In addressing the energy consumption and efficiency of a commercial building, it is essential to include transport considerations. Location and design of a commercial building can significantly influence the transport options available to the people that work in or visit the building. Parking spaces can increase dependence on car travel, lack of cycle racks or inadequate shower facilities will impact those who choose to walk or cycle to work and public transport access is important in providing transport choice to workers.

Energy Management in building design

Regarding current use of ISTs, energy efficiency of buildings is established using a number of measurement techniques:

- Energy Efficiency Statements - NSW Department of Energy Building Energy Manual, 1993
- DPWS is currently developing capability with EcoTect and TAS software to model building performance
- AS2725 for existing buildings - use actual historical figures - benchmark against other similar buildings to gauge energy efficiency - investigate differences
- Energy consumption is measured in megajoules per square metre of net lettable area, these figures are then compared to the Property Council of Australia benchmarks.

For a summary schedule of case study building projects showing cost benefits from ISTs refer to APPENDIX 1 - CASE STUDIES SCHEDULE (NSW Government Funded)

The uptake of ISTs is highly input-cost sensitive. With recent deregulation of the electricity industry, the cost of electricity reduced by approximately 40% in April 1997. This effectively doubled the payback period for energy efficient products. Electricity costs have increased by 15% in 99 with a small improvement with payback assessments. Other inhibitions to uptake of ISTs are the generally high costs of emerging technologies, such as smart glasses, that are required to maximise outcomes.

WATER SAVING

In 1993, the Department of Public Works & Services (DPWS) established a Water Saving Service to help Government Departments, Councils and other major water users, to use water more efficiently.

The service assists in the reduction of water usage and hence costs by use of: water audits, leakage detection surveys, advice and installation of water efficient fixtures and by monitoring of usage. It has broken new ground in the water cycle management in some leading hospitals, correctional centres, railway stations, airports, universities and schools.

Total water cycle management is now considered in most projects undertaken by DPWS. It includes assessment of water demands, quality of water required for particular demand and non-water usage alternatives. It looks at water resources available including: potable and non-potable sources. It considers both financial and environmental factors to determine the most satisfactory solution.

Typical water usage performance measures used are:

Office Buildings	- kL/person/day
Hospitals	- kL/bed/day
Schools	- kL/pupil/day
Laundries	- litres/kg of dry weight of laundry

On projects undertaken, water savings of between 20 - 60% have been identified. Potential saving to clients exceed \$ 2.1 million p.a. and refunds for excess charges of \$0.9M. This represents an accumulated saving of \$8.4 million since 1992/93. It is considered that the service has the potential to ultimately save the NSW Government \$ 9 million p.a.

A pilot program of total water cycle management for TAFE was carried out at Newcastle and North Sydney campuses. DPWS has also prepared total water management programs for Department of Corrective Services and TAFE.

Further projects with positive returns have been completed in Townsville QLD, Alice Springs NT, Perth WA and Melbourne VIC and internationally in Bahrain.

In general, the IST strategic opportunities are for:

- Increased efficiency in use of water from town supplies
- Integrated water management, which will increase efficiency of water usage and reduce pollution.

- Reduction in impact on the environment with increased water management, construction and operational phase of projects.
- Saving in recurrent costs associated with operation of facilities

ENVIRONMENTAL PROTECTION AND ASSESSMENT (EP&A) ACT AND REGULATION

Building Code Of Australia (BCA)

The Department of Urban Affairs and Planning (DUAP), has responsibility for the on-going reform, development and maintenance of the BCA and the EP&A Act and Regulation. The main areas of performance on which buildings are assessed under the Building Code of Australia (BCA) relate to

- structural adequacy,
- fire safety matters (safe egress, spread of fire & suppression of fire) etc,
- access for people with disabilities
- health and amenity of occupants.

The main measures, under the BCA, are the Performance Requirements set for the various aspects of the building and the Deemed-to-Satisfy (DTS) provisions. The latter involve criteria or specifications that cover a multitude of detailed matters covered under the main areas of performance.

The BCA is a performance based code, which provides the user with the option of complying with the prescribed criteria or specification or developing an Alternative Solution.

Planning control areas that are considered to be performance criteria for assessment through the NSW Environmental Planning and Assessment (EP&A) Act and Regulation, are:

- internal circulation,
- solar heat reflectivity of external wall glazing,
- solar access,
- orientation,
- siting,
- site topography,
- microclimate control,
- building materials,
- landscaping,
- streetscape,
- views,
- heritage issues,
- building envelope design,
- privacy,
- security,
- storm water

Under the EP&A Act the main measures are the instruments created under the Act (ie. Local Environmental Plans (LEPs) or Development Control Plans (DCPs)) and other Departmental publications such as the "NSW Model Code" for performance based multi-unit housing. Through these measures, matters such as solar access, orientation, and other areas as

described above as performance criteria for assessment, are monitored in relation to the standards provided therein, to facilitate their evaluation.

The performance of the measures are monitored through the feedback obtained from various Government agencies (including local Government), industry groups, professional associations and members of the public. Much information is gained through this administration's provision of free advisory services, both on planning and building performance measures and various consultation processes.

The results of such monitoring are then reviewed and the conclusions are assessed. As a result, if necessary appropriate amendments to the EP&A Act, Regulation and the BCA are put forward for input and review from appropriate and relevant organisations. The manifestation of these processes is often seen through actual amendments to the legislation and the BCA. These are management processes that are administered through local Government and implemented by the building industry generally. Alternatively issues are sometimes overcome by the provision of advisory/guideline material or model codes (eg. "NSW Model Code for performance based multi-unit housing and the "Stringy Bark Grove code).

AVAILABILITY OF INFORMATION TO ASSIST ADOPTION OF ISTs

There is a broad range of available tools and programs to assist in the adoption of IST.

Specific-issue stand-alone IST design tools, most of them software based, abound. That is, there are individual packages that do not relate well to other packages. Whole-building environmental performance assessment tools using benchmarking and rating processes are much more complex to develop. Australia has very few such tools in current practice however, some are about to be launched, or are in advanced development.

Australian tools:

- Building Materials Ecological Sustainability Index (BES)
- Commercial Buildings Greenhouse Ratings Scheme, SEDA
- GBTool, by Green Building Challenge- internationally developed environmental performance assessment framework, now with an Australia-specific version in current development. The Australian version will be available in mid 2000. G13Tool facilitates a full environmental description of the building and its environmental performance, and also allows users to carry out the assessments relative to regional benchmarks. Its output is an environmental rating profile for buildings against a range of 96 environmental criteria in areas of Resource Inputs, Environmental Loadings, Quality of Indoor Environment, and Costs.

International tools - English speaking world:

- BREEAM (Building Research Establishment Environmental Assessment Method), is a building rating certification, BRE, UK. It compares the environmental impact of a building against defined standards. It has been used on offices, superstores, industrial units and homes in the UK and internationally.

- BREEAM Canada, existing offices assessment, Canada - a regional development of BREEAM.
- BEPAC (Building Environmental Performance Assessment Criteria), British Columbia. A more sophisticated building rating system called BEPAC has been developed in Canada, but this system is not currently active as a commercial real estate marketing tool. Its assessment tools are for internal use by building owners and managers.
- HK-BEAM, (Hong Kong Building Environmental Assessment Method), existing offices assessment, Hong Kong. HK-BEAM provides a cost effective and consistent management tool to benchmark performance, identify priorities, and set targets for improvement in an office building or property portfolio. It defines 56 best practice environmental criteria for a range of design and management issues. Premises are assessed against these criteria and 'credits' awarded where they are satisfied, giving clear guidance on how performance can be improved.
- LEED Building Rating Scheme, US Green Building Council. LEED aims to provide a clear marketing distinction for developers and owners by rating the environmental performance (including ISTs) of new and substantially renovated commercial buildings. The LEED program is notable for its consensus-based market driven approach to encouraging green commercial buildings. The development of the system has received extensive input from the Council's membership, which represents many facets of the building industry, including manufacturers, architects, developers, and environmental organisations
- Eco-Quantum, the Netherlands -English version currently only for residences.
- Environmental Preference Method, EPM, the Netherlands. The EPM considers environmental impact throughout the whole life cycle of a building material or product. A preference ranking has been developed for the major construction elements in a building. Included in the main issues considered in the assessment are: energy consumption at all stages (including transport), water consumption, repairability, reusability, and waste. An English language version is published.
- C-2000 Program for Advanced Commercial Buildings, Canada.
- Green Building Advisor, GBA, by CREST, US - a global version being developed with regional customisation capabilities. The GBA is an interactive software program that identifies project specific strategies to improve the environmental performance, cost-effectiveness, and healthiness of a building and its site from pre-design through occupancy.

Other guidance sources:

- A discussion paper *Economic and Environmental Life Costs of Buildings*, was prepared in August 1998 by DPWS for the Department of Industry Science and Resources, (previously DIST), examined the relationship between environmentally sustainable building practices (including ISTs) and whole-of life costs. It demonstrated whole of life economic savings that have been achieved through environmental design, energy

efficiency, water efficiency, and waste reduction. While the paper was of international scope, Australian case studies were collected and demonstrate that environmental design has achieved economic savings in Australia from:

- ◆ retrofitting and saving on operating costs
- ◆ retrofits to reduce consumption and avoid expensive upgrades of infrastructure new designs that share capital infrastructure
- ◆ new designs that avoid expensive capital and ongoing running costs

The Conseil International du Batiment (CIB) is a global network for international exchange and cooperation in research and innovation in building and construction in support of improved performance of the built environment. The CIB runs 60 Working Commissions and Task Groups whose scope covers technical, economic, environmental, organisational and other aspects of the built environment during all stages of its life cycle. They address all steps in the process of basic and applied research, documentation and transfer of the research results, and the implementation and actual application of them.

- The US Green Building Council (USGBC) promotes green building policies, programs, technologies, standards and design practices across the US. It draws together over 100 leading national organisations from an array of professions. The organisations include product manufacturers, environmental groups, building owners, utilities, state and local governments, research institutions, professional societies, colleges and universities. The issues being addressed by the USGBC are exactly the issues that need to be addressed in Australia, and include economic analysis, full cost accounting, green building rating systems, life cycle analysis, and education of the building industry.
- The International Energy Agency (IEA) is the energy forum for 24 Member countries including Australia. IEA objectives include the development of alternative energy sources and increasing the efficiency of energy use and assistance for the integration of environmental and energy policies. IEA shared goals is international cooperation in the development and dissemination of energy technologies, in particular; expanding basic understanding of existing technical processes and reduce their costs; removing barriers to market deployment; fostering sharing of operating experience and expand general awareness of technological capabilities.

CONCLUSION

The NSW Government is committed to working with the construction industry to improve building performance and develop further initiatives in building design, energy consumption and life cycle management.

The NSW Government will continue to play a leadership role to facilitate changes that increase the performance value of buildings.

APPENDIX 1

CASE STUDIES SCHEDULE

(NSW Government Funded)

ITEM	PROJECT NAME	DEVELOPMENT	ENVIRON. FEATURE	ECONOMIC SAVING
1 .	Manly Hydraulics Laboratory	Laboratory	Design Energy	Capital savings of \$220,000. Recurrent savings of \$412,000 p.a.
2.	Buxton Public School	School	Design Energy &LCA	Reduction in recurrent energy and water costs, improved learning environment - not estimated
3.	New Sydney Showground - Zone I	Showground	Design Energy	Reduced capital costs and projected energy savings of 23.5GYweek by designing for natural/mechanical ventilation in lieu of full air-conditioning. Daylighting use also reduces energy costs. (Sic.)
4.	Stringybark Grove	Multi-Residential	Design Energy Water	Internal rate of return is 7.5%. Benefit-cost ratio of 1.41 at discount rate of 4% or 0.82 at 10% (sic.)
5.	EPA Chemistry Laboratory	Laboratory and offices	Design Energy LCC	Daylighting design for recurrent \$3,250/yr saving in lighting power costs. Environmental analysis of materials produced \$22,000 capital saving for external walling
6.	Lithgow Hospital	Hospital	Design Energy	Recurrent savings of \$80,000 energy costs with simple payback period of 6.9yrs from geothermal
7.	Dubbo Juvenile Justice Centre	Juvenile justice	Design Energy	Capital savings of \$67,000, recurrent savings of \$36,000/yr from geothermal
8.	Lithgow Correctional Centre	Correctional Centre	Energy	Investment of \$46,450 with a simple payback period of 8 months, recurrent savings of \$68,700/yr.
9.	MSB Waterways Rozelle Bay	Office and workshops	Energy	Investment of \$15,000 with a simple payback period of 4 months, recurrent savings of \$53,800/yr.
10.	Bankstown	Classroom,	Energy	Investment of \$77,380 with a

	TAFE	off ices, Labs		simple payback period of 37 months, recurrent savings of \$25,400/yr.
11.	McKell Building, Sydney	Off ices	Energy	Investment of \$71,950 with a simple payback period of 14 months, recurrent savings of \$63,000/yr.
12.	Land Titles Office, Sydney	Offices and stores	Energy	Investment of ~1 04,400 with a simple payback period of 17 months, recurrent savings of \$74,800/yr.
13.	Royal Newcastle Hospital	Hospital	Energy	Investment of \$760,000 with a simple payback period of 36 months, recurrent savings of \$258,000/yr.
14.	McKell Building	Off ice	Water	Investment of \$13,000 for recurrent savings of \$15,000/yr
15.	Broken Bay Sport and Recreation Centres	Residential and admin.	Water	Water savings in order of 30% and avoided expensive augmentation of infrastructure
16.	John Moroney Correctional Centre	Correctional	Water	Recurrent cost savings \$25,200/yr from expenditure of \$80,000
17.	Werrington TAFE	Education	Water	Recurrent cost savings \$100,00/yr (water quantity reduced from 259 kL/day to kLday)
18.	Camperdown Childrens Hospital	Hospital	Water	Recurrent cost savings \$220,000/yr
19.	Hunter Institute of Technology.	TAFE college	Water	Recurrent cost savings \$30 - \$36,000 from \$42,000 expenditure.

Rating the greenhouse performance of commercial buildings

September 1999

Demonstrate your greenhouse performance to your employees, customers and clients, and create a competitive advantage for your business.

Introducing the Building Greenhouse Rating Scheme

The Building Greenhouse Rating Scheme is a voluntary program for office buildings, designed to enable building owners, managers and tenants to get market recognition for superior greenhouse performance and identify ways in which greenhouse performance can be improved.

Star ratings can be awarded for the base building (central services), a tenancy or the whole building. The ratings are based on energy-related greenhouse gas emissions, adjusted to account for climate and how the building is used. *The more stars, the better the performance.*

The rating methodology and a software rating tool are available to help you self-assess at no cost. However, you can only promote the rating if it has been officially reviewed by a SEDA assessor and you pay the appropriate fees.

Why worry about greenhouse gas emissions?

The 'greenhouse effect' refers to a blanket of gases that trap the sun's warmth in the earth's atmosphere. Although a natural phenomenon, recent human activity has meant that the concentration of greenhouse gases, particularly carbon dioxide (CO₂), has increased significantly in the atmosphere. This is likely to have a serious impact on global climate, including an increase in temperature and an increase in the incidence and severity of weather events. Australia has committed to reducing its emissions of greenhouse gases.

Why rate commercial buildings?

Commercial buildings in Australia generate around 35 million tonnes of CO₂ emissions each year as a result of the energy they consume. With business-as-usual, these emissions are estimated to almost double by 2010. Rating your building will help you identify your potential to reduce greenhouse emissions and compare your performance to others.

How does the rating work?

The star rating is derived from the actual amount of energy (electricity, gas, coal or oil) you consume in a year. This means the rating reflects the way energy is managed as well as how efficiently the building is designed.

Why rate greenhouse performance and not energy efficiency? It is the *greenhouse* impact of building operation that is important. The greenhouse impact is determined by both the amount *and* the type of energy used. Different types of energy such as gas, cogeneration and renewables are all less greenhouse-intensive energy sources than coal-generated electricity. By rating the greenhouse performance, the scheme encourages all strategies for reducing greenhouse emissions, not just energy efficiency improvements.

How can I improve my rating?

In most buildings there are many cost-effective ways to improve your rating.

Introducing the Building Greenhouse Rating Scheme

Information sheet

Energy efficiency improvements can be as easy as enabling Energy Star office equipment or tuning your existing building management system. Initiatives like this are good investments, and will keep saving you money year after year. Combining energy efficiency improvements and greener fuel sources makes even more sense. If you invest at least some of your savings from efficiency improvements in opting for a less greenhouse-intensive energy source, you can reduce the greenhouse impact of your building significantly—and still improve your bottom line!

Can I use Green Power to improve my rating?

Green Power is a national accreditation scheme for electricity generated from renewable sources. There are no greenhouse emissions associated with Green Power so it offers a way of improving your rating without the need to spend capital. However, Green Power will cost a bit more than conventional electricity, so unless you combine it with energy efficiency measures you might be spending a bit more on *ongoing* energy costs.

As a tenant, should I only look for 5 -star buildings?

When looking for new office space, ask your prospective landlord how well the base building rates. A greenhouse rating can help you compare building performance, and you should seek the highest rating possible. There won't be many 5-star buildings just yet, and a 3-star building is performing very well in today's marketplace.

Will I have to pay more for a building or office with a good rating?

A good greenhouse rating shouldn't cost more. A high rating will usually reflect an efficient building, using less energy and with lower operating costs.

Can I trust this rating?

The rating methodology was developed by SEDA in conjunction with industry representatives. The documented methodology is available for you to review. SEDA provides an official rating only after an official validation process.

What about new buildings?

In addition to the official performance rating, SEDA is also developing a 'commitment rating', which will apply if you're designing a new building or planning a refurbishment and wish to commit to reaching and maintaining a particular greenhouse rating. You will soon be able to use an official commitment rating to promote your new or upgraded building.

How much does a rating cost?

You can self-assess your building or tenancy for free. Just download the rating tool from the SEDA website. However, to obtain an official rating you will need to contact SEDA. An official rating will cost around \$600 for a typical office, although larger buildings may cost more depending on floor area. The fees are negotiable for special circumstances, such as small sites, multiple sites or repeat ratings. Fees are charged to recover the costs of the official assessment and scheme promotion.

Any other questions?

Call SEDA on 02 9291 5260 or visit our website at www.seda.nsw.gov.au

For further details, contact SEDA

What the industry's saying

"The Building Greenhouse Rating Scheme is a world-first initiative to harness opportunities for greenhouse gas reductions in the commercial building sector. The scheme, developed by SEDA and the property industry, will help businesses gain a green competitive edge in the market place."

Hon Kim Yeadon, NSW Minister for Energy

"This voluntary market based initiative will help Australia to reduce greenhouse gas emissions and meet our international commitments."

Gwen Andrews, Executive Director, Australian Greenhouse Office

"The Building Greenhouse Rating Scheme shows that investors can equally pursue corporate and environmental goals in the pursuit of more ecologically sound cities."

Peter Verwer, Chief Executive, Property Council of Australia

"This scheme will shift the focus of the building industry from a first capital base mentality to one of life cycle efficiency. Clients will now be provided with quantifiable evidence that it is far better in their commercial interests to construct a well performing building than it is to build something that is simply cheap."

John Murray, National Executive Director, Master Builders Association

"ABEC is keen to work with SEDA in encouraging broad industry support. The Council is prepared to work with SEDA, relevant State bodies and authorities and other interested organisations, in examining the feasibility of extending the scheme nationally at an appropriate time."

John Wells, Executive Director, Australian Building Energy Council (ABEC)

"ACF warmly congratulates SEDA on the development of its Greenhouse Building Rating Scheme. Though voluntary, this scheme - is an excellent first step in assisting the NSW building industry play its part in slashing Australia's greenhouse pollution."

Peter Garrett, President, Australian Conservation Foundation

"The Nature Conservation Council of NSW supports the SEDA Greenhouse Rating scheme as a great way to focus on the economic efficiency savings that energy efficiency can deliver. We look forward to the day when all homes, businesses and industries can be rated and improve their performance."

Kathy Ridge, Executive Director, Nature Conservation Council of Australia

"The Building Greenhouse Rating scheme is a positive step in encouraging the commercial building sector to embrace energy efficiency and become more environmentally responsible energy users. As a leader in promoting energy efficiency and the use of renewable energy, Energy Australia believes the scheme has the potential to significantly reduce Greenhouse gas emissions in the commercial building sector."

Paul Broad, Managing Director, Energy Australia

Building greenhouse rating scheme

"Lend Lease believe the rating tool will simplify the benefits of good design to the community, and will serve to promote public awareness of greenhouse gas production. The tool will provide a simple rating which will allow clients to differentiate smart base design initiatives. We believe the increase in awareness will promote initiatives such as energy efficient design and cleaner energy sources. As an industry leader in sustainable developments, Lend Lease are proud to be partners in the launching of the rating tool. As industry leaders, Lend Lease see the rating scheme as way to promote our point of difference. "

Mark Menhennitt, Director of Technical Services Group, Lend Lease Projects

"Reducing the amount of energy used in both the production and operation of buildings is a major issue for architects. On adopting a comprehensive environment policy in the early 90's, the Royal Australian Institute of Architects set out to develop a key reference and resource for building design professionals in the form of the Environmental Design Guide that is now operated by the Australian Council of Building Design Professions. Therefore the **RAIA welcomes** SEDA's initiative and offers its support for the implementation and development of the Building Greenhouse Rating Scheme. The **RAIA** believes this voluntary code will be a valuable adjunct to future regulatory reform aimed at reducing greenhouse gas emissions. '

Ric Butt, Past President, The Royal Australian Institute of Architects

"The EcoDesign Foundation welcomes SEDA's Building Greenhouse Rating Scheme because it introduces a new basis for competitiveness. A high star rating will come to signify premises that have been intelligently designed or retro-fitted and which are managed to provide comfort without excessive energy use. Conversely low ratings will signify inferior buildings and unaware building users."

Anne-Marie Willis, Assistant Director, EcoDesign Foundation

"On behalf of the members of the NSW Division of AIRAH, we wholeheartedly support the aims and objectives of the SEDA Building Greenhouse Rating Scheme. We commend SEDA's initiative. AIRAH National already has a cooperative agreement with the Greenhouse Challenge Office and our members are ready to assist building owners and tenants implement this innovative development of the NSW Government."

Cees Lommers, National President, AIRAH
Grahame Gibbs, President AIRAH NSW Division

"The Sydney CBD commercial leasing industry is a competitive environment. In marrying owner supply and tenant demand, Colliers Jardine use an innovative software programme - Real Estate Analysis Planning System (REAPS) to weight the variables prospective tenants rate as important in their relocation decision making process. With our consultative questionnaire based approach, we now measure the importance to tenants of environmental performance. Through the REAPS process we are pleased to be in a position to stimulate and respond to industry participants' awareness of these important environmental issues, and in particular the Building Greenhouse Rating Scheme."

James Young, Associate Director - Commercial Leasing, Colliers Jardine