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Department of Environment and Climate Change NSW

3

Sustainability and Property Management

Colonial First State

Global Asset Management

Department of **Environment & Climate Change** NSW

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3.0

Section 3 overview

This section of the Sustainable Property Guide deals with acquisition and operational management of commercial property. By adopting a sustainable approach, property managers can:

- reduce outgoings through more efficient use of resources
- ensure the implications of achieving sustainable performance are taken into account during the acquisition process
- establish systems to manage the sustainability of upgraded or purchased buildings so their ratings and performance can be maintained
- improve the quality of the indoor environment
- enhance the property's and owner's reputation, helping to attract and retain tenants.

Section 3 also offers advice on establishing priorities and systematically addressing operational sustainability.

3.1 Incorporating sustainability into decision making

Discusses the links between sustainability and business value and provides simple tools for developing the business case.

Worksheet 3.1A Sustainability business case template

Worksheet 3.1B Sustainability project evaluation

Worksheet 3.1C Sustainability project payback – worked example

3.2 Sustainability and property acquisitions

Explains how to assess sustainability at the acquisition phase, and how this can add value to the acquisition process by supplementing the condition assessment and providing information for the future management of the asset.

Worksheet 3.2A Sustainability evaluation – property acquisition phase

3.3 Tenant engagement and green leases

Provides advice on how to engage tenants and inform them about sustainability, and how to include environmental performance clauses in lease documentation.

Worksheet 3.3A Building rules and regulations – sustainability clauses

Worksheet 3.3B Green lease checklist

3.4 Assessing sustainability performance

Explains the current tools and rating systems for assessing building performance.

Provides guidance on measuring baseline performance, benchmarking and setting targets for sustainability performance.

Provides tools for performance auditing and advice on preparing a Sustainability Action Plan.

Worksheet 3.4A Property sustainability data template

Worksheet 3.4B Portfolio sustainability data template

Worksheet 3.4C Monthly property sustainability report (Excel)

Worksheet 3.4D Annual resource efficiency review

3.5 Managing energy

Provides guidance on measuring baseline performance, benchmarking and setting targets for energy performance.

Includes a planning tool for performance auditing, a checklist of building services, model specifications and issues to consider when briefing service providers.

Provides guidance on preparing an Energy Action Plan and engaging tenants in energy efficiency.

Worksheet 3.5A	Energy action plan
Worksheet 3.5B	Energy checklist – base building

3.6 Managing water

Provides guidance on measuring baseline performance, benchmarking and setting targets for water efficiency.

Includes a planning tool for data collection and performance auditing.

Provides guidance on preparing a Water Action Plan, briefing contractors who use water, and engaging tenants in water efficiency.

Worksheet 3.6A	Water action plan
Worksheet 3.6B	Water saving checklist
Worksheet 3.6C	Planning a water audit – scope of work checklist

3.7 Managing waste and recycling

Provides guidance on measuring baseline performance, benchmarking and setting targets for waste and recycling performance.

Provides guidance on preparing a Waste and Recycling Action Plan, briefing waste and recycling contractors, setting up contracts for these services and engaging tenants in waste reduction and recycling.

Worksheet 3.7A	Property waste and recycling review
Worksheet 3.7B	Waste and recycling action plan
Worksheet 3.7C	Waste collection contract checklist
Worksheet 3.7D	Clauses for cleaning, waste and recycling contracts

3.8 Managing indoor environment quality

Provides guidance on measuring baseline performance, benchmarking and setting targets for indoor environment quality (IEQ).

Provides guidance for developing an Indoor Environment Quality Action Plan, including management practices and tracking performance, assessing systems that ensure optimal IEQ and engaging tenants in improving IEQ.

Provides a fitout/refurbishment strategy that includes appropriate design attributes, product choices and post-occupancy monitoring for improved IEQ.

Worksheet 3.8A	Indoor environment review
Worksheet 3.8B	Indoor pollutant sources and tips on mitigation
Worksheet 3.8C	Indoor air quality considerations during fitouts
Worksheet 3.8D	Tenant survey: indoor environment quality

3.9 Responsible refrigerant use

Provides guidance on assessing refrigerants and equipment, and the systems used to benchmark their performance.

Provides guidance on developing a Refrigerant Management Plan, including collection and destruction of unwanted refrigerants and using alternative and natural refrigerants.

Worksheet 3.9A	Refrigerant and equipment review
Worksheet 3.9B	Refrigerant gases register

Incorporating sustainability into decision making

3.1

Context

This section discusses how to build sustainability into the decision-making process for a building or portfolio you are managing.

Your organisation will have its own approach to assessing potential building-related projects, based on estimating their value to the organisation, aligning them with business goals and taking into account the market, the risks due to inaction and the potential to maximise any opportunities that may arise. (See Section 2.3: 'Developing a sustainability policy and strategic goals for your organisation'.)

It's vital that sustainability – environmental, social and economic – is incorporated into this assessment process so that both direct and indirect benefits (e.g. improved reputation or marketability resulting from good environmental performance) can be part of the value matrix.

This does not apply to 'sustainability' initiatives only. Incorporating sustainability criteria into all decision-making processes is a critical component of becoming a sustainable property organisation because many seemingly unrelated business decisions can impact on your overall sustainability standing.

Steps: Integrating sustainability into the business case

The following steps relate to either a building or portfolio-wide project or initiative. These steps are a suggested guide only and should be modified to suit your organisation and the particular set of circumstances. (These steps are adapted from 'The Sigma Business Case Tool', Sigma Guidelines, www.projectsigma.co.uk/toolkit/BusinessCase.asp).

1 Identify overall impacts

Identify the significant environmental impacts of the building or portfolio, and the opportunities and risks they present, so proposed initiatives can be considered within this context.

What's in this section

Determine whether a proposed initiative will increase or decrease the building's or portfolio's overall environmental impact. For example:

- Will installing more efficient lighting or new equipment reduce overall greenhouse gas emissions?
- Could expanding the refrigeration capacity in a retail development increase the property's overall energy intensity?
- Does the project have hidden environmental impacts? For example, the impact of redundant fittings from a major lighting upgrade not being recycled.

2 Identify perceptions and expectations

Will the proposed outcome meet your stakeholders' expectations – including investors and tenants? For example, upgrading a base building to meet a 3 star NABERS Energy rating may not meet your tenant's expectations of a 5 star building. However, it should be noted that a 5 star NABERS Energy rating would be difficult to obtain in most established buildings. How you manage your tenant's expectations will influence your ability to maximise opportunities, minimise risks and promote the outcomes.

3 Make it relevant

Does the initiative clearly align with your corporate commitment and broader business goals? Link the opportunities and risks associated with the proposed initiative with your organisation's strategic objectives to map the interactions and impacts. Wherever possible, follow the language and structure of existing corporate plans so your proposal is easily understood by your intended audience.

4 Expand your evaluation criteria

Expand the criteria you use to assess the viability of potential projects and initiatives to include the indirect considerations highlighted in Worksheet 3.1B. Workshop major projects or strategies so that cross-functional perspectives – such as those from an engineering, marketing or property management background – all contribute to decision making and priority setting. As part of the evaluation:

- Focus on initiatives that address the highest risks or most attractive opportunities.
- Identify the best delivery mechanisms e.g. include in next capital works upgrade or upon acquisition of a property.
- Make sure any operational savings are included as part of any return-on-investment or payback calculations.

Lighting control upgrade pays for itself in less than 18 months

'Colliers International initiated a pilot study at 52 Alfred Street, North Sydney, looking at the installation of controllers to the building lighting system.

This inexpensive system works on the basis that fluorescent tubes only require full voltage to turn on, after which they can operate with up to 30% less power without compromising lighting levels. No modification to existing light fittings was required, and no additional maintenance or repair costs were incurred as a result of the installation.

Benefits

In 12 months the trial achieved:

- total savings of $3,316
- total reduction of 118,202 kWh, and
- total reduction in greenhouse gas emissions of 111,113 kg/$CO_{2\text{-}e}$

with a 16-month investment payback.'

Colonial First State Global Asset Management

- Include indirect values e.g. reputation and market attraction.
- Consider whether project savings can be directed to other sustainability projects.

5 Back it up

Back up your proposal with examples, data and supporting information for each opportunity or risk, both from outside and within your organisation. Include financial costs and benefits wherever they can be identified. Worksheet 3.1C provides a worked example calculating the payback for a sustainability project (a lighting upgrade).

Consider indirect and contingent costs. The table below lists five tiers of environmental cost accounting, some of which may be relevant to various stages of the property management cycle and hence included in the business case.

Questions to consider throughout the process

- What are our competitors doing, e.g. have they committed to a 4.5-star NABERS Energy portfolio average?
- What do our stakeholders expect – does it meet market demand?
- How can extra value be added e.g. can the project be used as an example to help tenants or other building managers improve their performance?
- What risks could arise from the 'do nothing' option?

Tiers of environmental cost accounting

Tier	Description
Conventional costs – direct	Include costs of direct raw materials, utilities, labour, supplies, capital equipment and related depreciation.
Potentially hidden costs	Include upfront environmental costs incurred when procuring or building the property (e.g. cost of design, approval and construction), regulatory (e.g. waste management, pollution control, licensing) and voluntary costs during operation (e.g. building monitoring and reporting costs, environmental reporting costs) and back-end environmental costs (e.g. future costs of decommissioning, cleaning and rehabilitation etc.).
Contingent costs	Costs that may or may not be incurred at some point in the future, and may include: cost of remedying or compensating for future environmental incidents (such as Legionnaires outbreak), fines and penalties for future regulatory infractions, cost of meeting new environmental regulations (e.g. cost of carbon).
Relationship and image costs	These costs are difficult to determine and would seldom be identified separately within an accounting system. However, they could be expected to have influence on the value of intangible assets such as goodwill, branding and so forth. Examples are the ability to attract ethical or responsible investors or the cost of retaining a property listed on a sustainable property trust.
Societal costs (externalities)	These costs are often referred to as externalities and represent costs that an organisation imposes upon others as a result of its operations, but which are generally ignored by the organisation. Could include environmental damage caused by the organisation for which it is not held accountable or adverse health effects caused by organisation-generated emissions for which the organisation is not held responsible.

Source: Western Australia Industry Group, 2005 and adapted from 'An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts and Terms' United States Environmental Protection Authority, Washington DC.

If the project does not meet your internal hurdle rates or payback period investigate external options such as state and Commonwealth Government funding support (see NSW Green Business Program).

6 Keep it dynamic

Make sure your business case is dynamic – keep it up to date and develop it further as priorities change. For example, energy projects that might not have met hurdle rates three years ago may now be viable with significantly increased energy contract prices. Your business case also needs to reflect increases in tenant and staff awareness and knowledge. Communicate and raise awareness of the benefits of environmental improvements including cost savings. Review the outcomes and provide feedback for the next business case.

Further information

- *Valuing Green: How green buildings affect property values and getting the valuation method right,* Green Building Council of Australia, Australia 2008, www.gbca.org.au
- *Green Value, Green Buildings, Growing Assets*, Royal Institution of Chartered Surveyors, United Kingdom 2005, www.rics.org/greenvalue
- *Building Refurbishment – Repositioning your Asset for Success*, Jones Lang Lasalle, March 2005
- *The Dollars and Sense of Green Buildings*, Green Building Council of Australia 2006, www.gbca.org.au
- 'The Costs and Financial Benefits of Green Buildings. A report to California's Sustainable Building Taskforce', Greg Kats, October 2003
- 'Examining the Cost of Green' Davis Langdon, October 2004 www.davislangdon.com
- 'Managing for Sustainable Development: Using Environmental Management Accounting and Sustainable Development Reporting', www.c4cs.curtin.edu.au/resources/publications/2003/managing-for-sustainable-development.pdf
- 'An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts and Terms' United States Environmental Protection Agency, Washington DC
- 'The Sigma Business Case Tool': Sigma Guidelines, www.projectsigma.co.uk/toolkit/BusinessCase.asp
- NSW Green Business Program, www.environment.nsw.gov.au/grants/ccfgbp.htm
- 'Managing Investments in a Changing Climate', Institutional Investors Group on Climate Change (IIGCC), 2006

NSW Green Business Program

The NSW Green Business Program provides $22.5 million over five years for projects that will save water and energy in business operations in NSW. Funding is available across two streams for:

- market transformation – for water and/or energy saving projects which stimulate lasting structural and behavioural changes in the marketplace
- direct measures – for projects which deliver immediate water savings at a site or group of sites.

Activities which are eligible for funding under the Green Business Program include, but are not limited to:

- education and technology trial activities which increase the adoption of efficient technologies and practices
- projects which improve the efficiency of buildings, appliances and industrial processes
- projects which reduce peak electricity demand
- projects which reduce demand for electricity or water from electricity or water supply networks – e.g. co-generation, fuel switching, water recycling or stormwater harvesting.

For more information visit the Grants and Funding website at www.environment.nsw.gov.au

- 'A climate for change (A trustee's guide to understanding and addressing climate risk)' IGCC Investor Group on Climate Change Australia/New Zealand, www.igcc.org.au
- Royal Institution of Chartered Surveyors (RICS):
  - 'Transforming Existing Buildings: The Green Challenge', Final Report, March 2007
  - 'Financing and valuing sustainable property: we need to talk', April 2007
  - 'Carbon management of real estate', Guidance note, April 2008
  - 'The City Climate Challenge for 2050', 2007
  - 'Surveying sustainability: a short guide for the property professional', 2007

Worksheets

Review and use these Word documents:

3.1A Sustainability business case template

3.1B Sustainability project evaluation

3.1C Sustainability project payback – worked example

The business case at Investa

Energy

'The most compelling justification for our steadfast pursuit of energy savings, after meeting growing tenant demand, is capital efficiency. Approximately half of our energy efficiency improvements over the past three years have come about through tight management controls (i.e. matching supply of building services to demand) that did not require capital investment, and the other half arose out of capital expenditure on meters and efficiency projects with a forecast payback period of less than three years.

Overall, we estimate the combined return on investment in energy saving initiatives to be 60.1%. This figure is based on a targeted investment of $2.160 million to date that is delivering ongoing savings of 19 kWh/m^2 (electricity) and 53 MJ/m^2 (gas) over 650,000 m^2 which translates to $1.298 million in savings per annum.

In some of our buildings these savings pass directly to tenants due to their lease structures. It is our strong view that even where this is the case, a high yielding reduction in the cost burden associated with energy wastage ultimately rewards the landlord and tenants alike.

Water

Overall, we estimate the combined return on investments in water saving initiatives to be 75.9%. This figure is based on a capital investment of approximately $639,000 to date on metering and conservation initiatives that are delivering measured savings of 745 kL/m^2 over 500,000 m^2: a saving of almost $485,000 per annum when sewer discharge factors are included.'

Investa Property Group
Sustainability Report 2006

Worksheet 3.1A

Sustainability business case template

This is an example only – adapt this worksheet to suit your organisation's requirements.

Opportunity name	A simple statement describing the opportunity e.g. 'Greenhouse gas reduction plan', 'Recycling system for tenants', or 'Waterless urinals installation', etc.
Brief description	Describe the scope of the opportunity, what the current situation is and what business outcomes are likely (direct and indirect).
Relevant value drivers	List the business drivers that influence the opportunity, e.g. benefits such as reduced waste disposal costs, reduced workplace emissions, increased operational efficiency, reduced transport costs, improved reputation, improved marketability, etc.
Success indicators	How will success be measured? (e.g. operational cost savings, resource efficiency, market perception of leadership, ability to attract ethical investors, etc.)
Alignment with our goals and policies	How does the initiative demonstrate alignment with organisation values, business goals, sustainability policies or strategies and other policies or strategies? Is the project a risk to these?
Research and analysis	What additional research or analysis will have to be done to ensure benefits can be realised? (market research, life-cycle analysis, building services study, etc.)

Suggested participants	Which service groups within the organisation will need to be involved? (procurement, legal, operations, environment, etc.)
Other stakeholders	Will we need to engage with any organisations outside the company? (managing agents, tenants, contractors, suppliers, local government, etc.)
Potential actions	What specific actions will need to be done to further scope, evaluate or act on the opportunity?
Preliminary timeline	What are the time milestones?
Cost-benefit analysis	What is the cost of implementation? What are the financial benefits? What unquantifiable benefits are likely? What is the return on investment? What is the whole-of-life cost?

Source: Adapted from 'The Sigma Business Case Tool', Sigma Guidelines www.projectsigma.co.uk

Worksheet 3.1B

Sustainability project evaluation

Use the following as a guide to evaluate the various sustainability project options. This is an example only – adapt this worksheet to suit your organisation's requirements.

	Name of opportunity or project:
Feasibility	Are there significant obstacles or risks that could threaten the success of the initiative or opportunity?(list them)
	How straightforward would executing the project be, in terms of internal and external collaboration requirements?
	Can the project be delivered as part of a planned building upgrade?
	What are the resources needs, both financial and human? Do we have the capacity to support the project?
Attractiveness	Is the project well-aligned with the current strategic priorities of the organisation?
	Will this project be enthusiastically received by our customers and suppliers and other key external stakeholders? Does awareness training need to be conducted among internal stakeholders to support the project?

	Name of opportunity or project:
	What are the market expectations? e.g. minimum 4.5 star NABERS Energy rating
	Are we likely to realise a significant improvement in the proposed indicators of value? Consider financial and reputation value.
	Detail the environmental and social outcomes of the project. List improvements or impacts on energy, water, waste and recycling, transport, management, indoor environment quality, emissions, ecology, etc.
	What is the impact on our sustainability goals and building performance?
	What is the risk of not implementing the project?
Competency	Do we have the right set of project management and environmental skills and competencies in-house?
	Can we acquire the needed competencies externally?

Source: Adapted from 'The Sigma Business Case Tool', Sigma Guidelines.

Worksheet 3.1C

Sustainability project payback – worked example

This is a worked example of the cost benefit of upgrading a new lighting system.
Use this as a guide to evaluate the payback on sustainability projects. This is an example only – adapt this worksheet to suit your organisation's requirements.

Project name:	**Upgrade to new lighting system**			
	Existing fixture		**New fixture**	
Lamp type	Standard fluorescent		Triphosphor fluorescent	
1. Power input				
Number of fittings	20		21	
Number of lamps per fitting	2		1	
Total number of lamps	40		21	
Power input for each lamp	36	watts	36	watts
Power input for each ballast*	9	watts	4	watts
Total power input = total number of lamps x power input of (lamp + ballast)	1800 = 40 x (36+9)	watts	756* = 21 x (36+4-4)	watts
2. Annual energy consumption by converting power input to kilowatt hours (kWh)				
Operating hours per year	3000	hours	3000	hours
Total annual energy consumption = total power input/1000 x operating hours per year	5400 = 1800 watts x 3000hr/1000	kWh	2268 = 756 watts x 3000hr/1000	kWh
3. Annual lighting energy costs				
Average electricity price ($ per kWh)	$0.10		$0.10	
Total annual lighting energy costs = energy cost x total energy consumption	$540 = $0.10 x 5400	kWh	$227 = $0.10 x 2268	kWh
4. Annual savings				
Energy saved = total energy consumption of (existing lights – new lights) Any additional hidden savings?	3132 = 5400-2268	kWh		

*Note: an electronic ballast will run a lamp at a lower wattage (i.e. 32 W) but there is still a ballast loss of 4 W. Therefore the power input for one lamp and the ballast = 36 W

Project name:	**Upgrade to new lighting system**	
	Existing fixture	**New fixture**
Lamp type	Standard fluorescent	Triphosphor fluorescent
Is the space air conditioned? If yes, 25% more energy savings can be made. If no, use initial energy savings calculated.	3915 kWh = 3132 x 1.25	
Total energy to be saved per year	3915 kWh	
Dollar savings per year = energy cost x total energy savings per year	$391.50	= $0.10 x 3915
Annual maintenance cost saved	$50	
Total dollar savings per year	$441.50 kWh	
Estimated conversion cost (parts and labour)	$1500.00	
5. Simple payback		
= conversion cost/total annual savings	3.4 years = $1500/$441.50	
Annual rate of return (ROR) = total dollar savings per year/conversion cost x 100	29% = $441.5/$1500 x 100	A 100% ROR means that the energy savings will pay back the conversion cost within one year. In this case it will be paid back in under a year
6. Greenhouse gas reduction	1 kWh = 1.06 kg CO_2, 1 MWh = 1.06 t CO_2[1]	
= total energy savings/1000 x 1.06 = tonnes of CO_2 abated	4.2 tonnes = 3915 kWh/1000 x 1.08	
On average, 1 car produces 4.5 tonnes of CO_2 in a year	Almost 1 car tonnes = 4.2/4.5	

[1] NSW emission factor (full fuel cycle) for electricity purchased by end users, 'National Greenhouse Accounts (NGA) Factors', Australian Government Department of Climate Change 2008 (www.climatechange.gov.au/workbook/index.html)

Sustainability and property acquisitions

3.2

Context

This section explains how to identify a commercial property's sustainability performance as part of its acquisition process.

The majority of existing buildings were not built with good sustainability practices in mind. Some perform well but others perform badly, with their performance across the board often inconsistent against rating tools and guides such as the National Australian Built Environment Rating System (NABERS), Green Building Council of Australia's Green Star and the Property Council of Australia's *A Guide to Office Building Quality*.

NABERS tools for commercial office buildings currently include NABERS Energy, NABERS Water, NABERS Waste and NABERS Indoor Environment. NABERS assesses the actual environmental impact of existing buildngs over the previous 12 months, whereas Green Star is a design tool aimed at reducing a range of environmental impacts in new buildings and fitouts. Performance varies with location, orientation, construction, plant, operation and other factors but good performance is often achieved because of good management rather than the systems in place.

In regard to sustainability the purchaser needs to know:

- how the building is performing, and how it rates using the appropriate industry environmental ratings tool and guidelines
- what its impact will be on the environmental performance of the whole property portfolio
- whether it will attract or retain tenants who are looking for accommodation with good environmental performance
- how, and at what cost, it can be improved to higher standards in the future.

What's in this section

The pre-acquisition inspection and assessment process is usually extremely busy and involves sorting and reviewing a lot of information in time for the purchaser to make a decision to proceed. This process requires an experienced team that is well briefed and able to plan and manage its work within a limited time frame.

All buildings are very different and a specific, detailed briefing is needed to make sure all the required information will be collected.

Until recently, pre-acquisition building inspections and technical due diligence (TDD) focused on identifying defects and risks relating to the physical condition of a property and its equipment, and assessing its level of compliance with environmental regulations. This data gathering and assessment process could be used to greater advantage. An astute purchaser will also want to know if the building can achieve the higher levels of energy efficiency expected by the market and at what price. In some properties it's relatively easy and inexpensive to improve energy efficiency; in buildings where no upgrading has occurred there will be easy wins. However, there are a few buildings where achieving energy efficiency, particularly the standards required by government tenants, will require significant investment. Information about the work this will entail and its likely costs and timing may affect the building's purchase price.

This information can also be beneficial when developing new performance standards for building service contracts or when negotiating new tenant leases. Timing of upgrading or refurbishment will normally be coordinated to coincide with lease renewals, rent reviews or re-leasing and this can also be factored in to the pre-purchase sustainability assessment.

Other areas that until recently were often not included in the acquisition review process are occupational health and safety and indoor environment quality, which includes indoor air quality. Tenants are far more aware of the risks from sick buildings and buildings with poor air circulation than ever before. Many tenants now understand that workplace productivity and their potential for attracting and retaining staff will be affected by the building they occupy. This in turn affects the demand and long-term marketability of the building. These aspects should all be considered when deciding whether to purchase and how much to pay.

Technical due diligence is usually an intensive process. Adding in the assessment of a building's environmental performance and environmental potential during acquisition increases the amount of detailed work required. It is unlikely that this work can be carried out within four weeks or less – the traditional time allowed. Time required will depend on the building and scope of work, but you should allow six to eight weeks to give enough time for a fully considered assessment.

What to look for

Look for aspects of flexibility in the building that would allow new systems to be incorporated. Review the fundamentally green aspects of the building including:

- Orientation and overshadowing
- Floor plate proportions (distance from window to core)
- Natural light
- Façade design and likely thermal efficiency
- Openable windows
- Floor to ceiling heights to allow maximum flexibility
- Riser duct space
- Car park or external space for waste management, water tanks, bike facilities
- Location of public transport.

Steps: Including sustainability in the acquisition review process

1 Brief the inspection team

Make sustainability evaluation part of the brief to the building inspection or TDD team. The traditional acquisition team skill set may need to be expanded to include this expertise. The team will need to ensure the purchaser obtains enough information about the building's performance to make an informed decision about the likely sustainability-related risks and opportunities entailed in the purchase.

Brief the inspection team on:

- the long-term strategy for the building, including whether it will be held or upgraded and sold
- whether the building will be upgraded immediately or over a longer term
- profiles of tenants to be targeted
- the performance standards, ratings and grades the building will be required to achieve.

It's important that the purchaser defines the target performance to be used in the team's report.

The team's job is to help the purchaser identify possible risks to capital and operational budgets, as well as possible risks to reputation. This may include looking out for issues that may be difficult to quantify at present but could have an impact in the future, such as a low NABERS Energy rating, making it difficult to attract tenants.

2 Gather information

Give the vendor a list of the information required for the sustainability assessment (see Step 3). This should be done at the earliest opportunity.

Carry out a site inspection jointly with the inspection team. Verify key data provided by the vendor and add additional information gained during the inspection.

3 Assess the property and benchmark it

Depending on the performance requirements or rating targets set by the purchaser, use Worksheet 3.2A: 'Sustainability evaluation – property acquisition phase', and NABERS Water, Energy, Waste and Indoor Environment to evaluate the building's current sustainability performance. The NABERS online self-assessment tool can also be used to benchmark the building's performance (www.nabers.com.au).

About NABERS

NABERS is the National Australian Built Environment Rating System managed by the Department of Environment and Climate Change NSW. NABERS is a performance-based rating system which measures the operational environmental impacts of existing buildings.

NABERS office tools can be applied to three distinct situations:

- **Tenancy** ratings that cover the space occupied by a single tenant and under the control of that tenant
- **Base Building** ratings that cover all office spaces for that building, and measure the parameters that are under the control of the landlord or base building
- **Whole Building** ratings that are a combination of both Tenancy and Base Building for the situation where a tenant is the owner and/or has control of all services.

For more information see www.nabers.com.au

You could also review the likely Property Council of Australia quality grading of the building and consider how the building will perform against its criteria – but again, this depends on the purchaser's defined requirements.

Identify aspects of the property's current performance that could be upgraded or that need to be upgraded to improve its sustainability performance.

4 Coordinate reporting

To gain the most value from this assessment, include the sustainability performance and associated costs and timing as part of the building inspection or TDD report. Ensure team members coordinate their findings and recommendations to avoid doubling up, missing or contradicting advice. For example, work recommended by a building services specialist may be superseded by the need to carry out an energy efficiency upgrade.

5 Develop a property improvement strategy

If the acquisition proceeds, develop a property improvement strategy listing key actions and initiatives to be undertaken based on the information obtained during the acquisition review process.

NABERS at acquisition

NABERS ratings, particularly NABERS Energy, are now embedded into the business strategies of Australia's property industry. NABERS ratings are a fundamental component in property acquisitions, strongly influencing whether buildings are bought or sold.

Before investing in a property, investors:

- determine the current NABERS rating of the building
- assess the potential for this rating to be improved, through due diligence processes.

Buildings with a high rating or the potential to achieve a high rating are a better investment due to lower operating costs, attractiveness to tenants, and protection against future growth in demand for efficient buildings. Additionally, many investors have set requirements for their buildings as a corporate responsibility, and must report ratings annually. Higher rated buildings will meet these requirements.

For more information see www.nabers.com.au

Worksheet

Review and use this Word document:

3.2A Sustainability evaluation – property acquisition phase

Worksheet 3.2A

Sustainability evaluation – property acquisition phase

The following evaluation should be undertaken with the help of technical specialists during the acquisition or handover period and given to the acquiring fund manager or portfolio manager. This worksheet includes both office space and retail space. This is an example only – adapt this worksheet to suit your organisation's requirements. Delete the sections not relevant to the property under review.

Section A: Property details			
Building/Centre name		City	
Street address			
Building age			

Size:		Building functions:	
No. of levels (excluding basement)		Office space	m^2
Gross floor area	m^2	Retail	m^2
Building net lettable area (NLA) incl. vacancies	m^2	Food outlets	m^2
No. of car parking levels (or area in $m^{2)}$		Carpark	m^2
Basement size	m^2	Other (list)	m^2
No. of car parking spaces			m^2
No. of disabled parking spaces			
No. of lifts, escalators and travelators			

Office tenancy			**Occupancy/use**	
Major tenants	% NLA occupied	No. staff	Total no. building occupants (excl. visitors and building contractors)	
			Standard weekly hours of operation	
			No. of floors with 24/7 operation	
			% vacancy (at time of assessment)	
No. of tenancies:				

Retail capacity			**Occupancy/visitation**	
	Number	GLAR	Hours of annual occupancy	
Specialty tenants			Annual total visitation	
Major tenants			Peak visitation (people/day)	
No. of tenancies			Standard weekly hours of operation	
% vacancy (at time of assessment)			No. of levels with 24/7 operation	

Industry benchmarks				
NABERS Rating	Base	Tenancy	PCA Grade (Guide to Office Building Quality)	
NABERS Energy			Green Star Rating (specify tool number used)	

NABERS Water NABERS Waste		n.a.		
NABERS IE				

Energy and greenhouse performance

Monthly performance (base building)	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**
Electricity consumption total kWh												
MJ/m^2 NLA or GLA												
Electricity costs total $												
$/$m^2$ NLA or GLA												
Gas consumption total MJ												
MJ/m^2 NLA or GLA												
Gas costs total $												
$/$m^2$ NLA or GLA												

Note: the above information may be available from property utility accounts or other property management records.

Year:		**200X**	**200Y**	Comments on any aspect of energy consumption or cost of energy supply.
HVAC electricity consumption (if known)	kWh			
	kWh/m^2			
After hours HVAC electricity (if known)	kWh			
	kWh/m^2			
Is there an Energy Management Plan (or similar) in place? If so, include a copy with this evaluation.				

Industry benchmarks

How does base building electricity consumption costs ($/$m^2$ NLA) relate to PCA operational benchmarks for a building of this category and NLA/GLA?	
Has a NABERS Energy, Water or Waste rating been undertaken? If so, list outcomes and name of organisation that undertook the rating.	

Greenhouse and global warming

	Units Tonnes $CO_{2\text{-}e}$ or kg $CO_{2\text{-}e}/m^2$	**200X**	**200Y**	**NABERS Energy** Most recent accredited NABERS Energy rating
Total GHG emissions				

What are the likely energy improvement measures that could be implemented to raise the NABERS Energy rating by 1 star?	
to 2 stars?	
to 3 stars?	
Estimate an indicative capital budget associated with raising the NABERS Energy rating to: 3 stars	
4.5 stars	
Is a refrigerant leak detection system installed?	

HVAC system

Briefly describe the **HVAC system** and its key components including any energy efficiency features.	Number	Type	Capacity and efficiency	Age
boiler plant				
chiller plant				
cooling towers				
air handling systems				
water reticulation systems				
air filtration systems				

Briefly describe the scope of the HVAC control systems and impact on energy efficiency:	
type (e.g. pneumatic, electronic, DDC)	
control of HVAC systems	
economy cycles	
night purge	
Has an energy audit been undertaken in the last 5 years? What improvements have been implemented?	
Describe the carpark and basement ventilation system. Is carbon monoxide monitoring provided? Have any ventilation improvements been made as a result of poor air quality?	
Describe the domestic hot water systems installed in the building.	
Does the building have CO_2 monitoring to tenant areas? Provide details:	

Is power factor correction installed in the building? Provide details.	
List scope of energy sub metering systems i.e.	
house power	
lifts	
mechanical	
carpark	
gas	
Are these monitored on a monthly basis?	

Lighting

Briefly describe the lighting system including energy efficiency features:	
tenant controls	
lighting controls	
types of luminaires	
lighting zones (size in m^2/number/floor)	
dimming systems	
after hours controls	

Water and wastewater

	Units	**200X**	**200Y**		**Units**	**200X**	**200Y**
Total water consumption (mains supply)	kL			Cost of mains water	Total $		
					$/kL		
	kL/m^2			Cost of effluent discharge	$		
					$/$m^2$		

Quarterly performance (200X)	July to September	October to December	January to March	April to June
Consumption (kL)				
Supply costs				

Toilets			**Urinals**		
Flush volume	Number of women's	Number of men's	Type	Number	Flush volume
6/3 L dual flush			Manual flush		
9/4.5 L dual flush			Sensor-operated flush		
6 L full flush			Waterless		
9 L full flush			Other		
11 L full flush					

Showers		**Basins in amenities**		
Number	Flow rate (L/min)	Number	Tap type	Tap flow rate (L/min)

Water storage tanks			**Cooling towers**		
Capacity (kL)	No.	Location/use	Type	Refrigeration capacity (kWh)	Operating times

NABERS Water rating	
How do water supply and wastewater costs ($/m^2/pa) relate to the PCA operating cost benchmarks for a building of this type and NLA/GLA?	
Are submeters installed to monitor tenants' consumption and major water-consuming equipment? If so, provide a breakdown of % of total water use for each metered component. Are these submeters connected to a stand-alone system for monitoring?	
Have any water leaks been identified and repaired in the past 2 years?	
List any water saving devices used in the building (e.g. flow restrictors, low-flow shower heads, automatic taps etc)	
Is stormwater or rainwater collected and stored for use on site? If so, describe storage capacity and use.	

Waste and recycling

	Unit	**200X**	**200Y**		**Unit**	**200X**	**200Y**
Total solid waste sent to landfill	T			Annual cost of waste collection sent to landfill (collection, transport and tip fees)	$		
					$/m^2		
Total paper and cardboard waste collected for recycling	T			Annual cost of paper and cardboard collection and removal	$		
					$/m^2		
Total other recyclables (e.g. commingled containers)	T			Annual cost of other recyclables collection and removal	$		
					$/m^2		

NABERS Waste rating	
Is there a current Waste Management Plan in place, or similar e.g. waste minimisation strategy, to reduce waste going to landfill (e.g. increase recycling)? If so, attach a copy to this evaluation.	
Has a waste audit been undertaken in the last 5 years? If so, attach a copy to this evaluation.	
Describe the waste recycling system in major tenancies e.g. plastics, paper & cardboard, organics etc.	

Describe the waste recycling systems or infrastructure (e.g. compactors) in the base building e.g. plastics, paper & cardboard, organics etc.	
Describe any additional waste recycling or collection systems in the building for other materials e.g. fluorescent tubes, batteries, mobile phones, construction & demolition waste, furniture, electrical equipment etc.	

Workplace productivity

Is there a history of tenant concerns relating to poor indoor air quality? If so, what actions have been taken to address these concerns?	
Have regular air quality audits been undertaken? List key issues identified and rectification measures implemented.	
Has a hazardous material audit been undertaken within the last 2 years? List any key recommendations from the environmental due diligence assessment.	
NABERS Indoor Environment rating	

Transport and accessibility

Distance from bus stop	m	Disabled toilets on each occupied floor?	Y/N
Distance from nearest train station	m	Estimated workforce using public transport	%
Distance from public carpark	m	No. of designated motor bike spaces provided	
Disabled access from street to lift lobby?	Y/N	No. of designated bicycle spaces provided	
Disabled access from carpark to lift lobby?	Y/N	No. of shower facilities for cyclists	
Secure bike storage	Y/N		

List specific facilities for disabled accessibility (e.g. lifts, toilets etc)

Ecological diversity

Are there any trees on site subject to Council Tree Preservation Orders? Does the location of these trees impede future redevelopment (if intended)?	
Are there any areas of natural vegetation or wetlands on site that may have some ecological conservation value? If so, describe them. For example, old growth forests. See Green Star – Ecological (ECO – Conditional Requirement) Does the location of these areas impact or need to be considered in future redevelopment potential (if intended)?	
Does the site have a history of soil or groundwater contamination? List any key recommendations from the environmental due diligence assessment.	

Heritage conservation

Is there a current Heritage Conservation Order (or similar) on part of the site or the entire site? If so, describe the subject and the area of site affected.	

Tenant engagement and green leases

3.3

Context

Tenants are starting to ask questions about how sustainable their building and tenancy is ...'How energy efficient is this building? What is its NABERS Energy rating? Are we conserving water? Where does our recycling go? What is our carbon footprint? How good is our indoor environment quality?'

As well as being the impetus for requests like these, sustainability presents a great opportunity to create or consolidate valued relationships with your tenants. This in turn can reduce the likelihood of churn and help improve the environmental performance of the whole property.

Achieving your sustainable property commitments will usually require your tenants' involvement, and leasing arrangements can provide an ideal framework for this type of relationship. By fostering collaboration and sharing of financial or less-tangible benefits, leasing arrangements can help tenants establish more sustainable practices and open the door to tenant-driven sustainability improvements. Tenants can also help with promoting environmental and workplace improvements.

Tenants with green credentials or wanting to reduce their environmental impact are likely to be attracted to buildings that demonstrate a high level of sustainability performance. Finding a proactive building manager ready to help them achieve their goals may just seal the deal.

What's in this section

Steps: Actions to engage tenants

1 Improve your own performance

Lead by example: set targets and measure and report your own sustainability performance. Back this up by obtaining industry-recognised environmental credentials such as a NABERS rating. Make sure the rating is accredited so you can use it to market and promote your property.

Be proactive with operations and maintenance. Work with your tenants and look for continual environmental improvement.

2 Adapt existing building rules or user manuals

Adapt existing building rules or user manuals to include sustainability criteria. Clearly set out environmental requirements such as:

- instructions for using waste and recycling systems
- energy efficiency measures e.g. lighting controls and the need to turn off lights and equipment after hours
- water efficiency measures and the need to report leaks promptly.

Spell out your commitments as well, for example:

- monitoring and reporting sustainability performance
- maintaining a current NABERS rating
- providing bicycle storage and showers.

Examples of sustainability-related clauses that could be included in standard building rules and regulations are provided in Worksheet 3.3A.

Make sure tenant's operational policies and practices are consistent with the base building sustainability objectives and rules. This is especially important if tenants contract their own cleaning, waste disposal or recycling services.

3 Use a 'green lease'

A 'green lease' is any lease aiming to achieve sustainability outcomes – this concept is still being developed. A green lease can help you establish environmental and social objectives as part of the relationship with your tenant. You could use a green lease to complement the sustainability provisions in your building user rules and regulations. A leasing arrangement can be more comprehensive than user rules, placing obligations on both the building owner and tenant, and prescribing a partnership approach.

Green leases range from being prescriptive to collaborative. Strict requirements or commitments may be difficult or costly to enforce. The way in which tenants operate can have negative affects on the building rating; similarly the way the building is set up and operated can affect the tenant. There is therefore a case for collaboration but parties need to perform to agreed parameters.

Green leases include clauses on how the parties should work together and establish agreed parameters. You can also use a

Sustainability Advantage

Sustainability Advantage is a business support service from the Department of Environment and Climate Change NSW (DECC). It is designed to help businesses understand sustainability, successfully manage their operations to achieve better environmental outcomes and add business value.

Sustainability Advantage participants have the option to undertake a Staff Engagement module. With the support of DECC and their contractors, your organisation is supported to understand the principles and priorities for staff engagement and identify engagement leaders. Structured workshops will then allow you to:

- draft a staff engagement plan, ensuring tasks are linked to sustainability actions and goals
- implement the actions in the engagement plan with your staff.

For more information please contact Business Partnerships on (02) 8837 6000 or email sustainbus@environment.nsw.gov.au

green lease to educate tenants about implementing a sustainable fitout or running their office more sustainably. Some leasing agreements outline specific environmental management obligations for tenants, often relating to regulatory compliance.

Worksheet 3.3B is a checklist of issues that you could address using a green lease. Seek legal advice regarding the preparation and use of a green lease.

Green Lease Guide

As a starting point for collaborating with tenants on sustainability improvements, you could provide tenants with a copy of the *Green Lease Guide for commercial office tenants* (see www.livingthing.net.au/RC_Guide.htm#i16).

The Guide explains how base building attributes can benefit tenants and gives advice about sustainable commercial fitouts and sustainable ongoing management and operation. The Guide explains:

- what a green lease is, and what the benefits are
- what to look for when choosing which building to lease
- what to consider when making decisions about an office fitout
- what can be implemented into everyday office operations e.g. waste and recycling systems, purchasing recycled-content consumables and energy efficient office equipment.

The Guide was developed in partnership with Investa Property Group, the Department of Environment and Climate Change NSW, City of Sydney, City of Melbourne and the Institute for Sustainable Futures at the University of Technology, Sydney.

Green Lease Schedules

The *Green Lease Schedules* were developed by the Commonwealth Government to give Commonwealth agencies a legal mechanism for implementing the Energy Efficiency in Government Operations (EEGO) policy. The Schedules are separate from the lease so if there is a breach of the environmental provisions, it does not constitute a breach of the lease. The Schedules provide example clauses for different situations, e.g. gross and net leases with different levels of building occupancy (e.g. tenant occupies whole or part of the building). The Schedules can be found on the Department of the Environment, Water, Heritage and the Arts website at www.environment.gov.au/settlements/government/

Why Investa encourages green leases

'Every time we negotiate a green lease with a tenant we are looking for ways to achieve multiple outputs for each input. We attempt to link their goals with ours. Take enhanced natural light for example: the right design treatment will enhance productivity and enjoyment, reduce energy use and, ultimately, it should encourage a tenant to stay with the building long term.'

Craig Roussac, General Manager – Sustainability, Safety and Environment, Investa Property Group

Commonwealth Government Green Lease Schedules

There are 8 Green Lease Schedules, designed for a variety of situations. Features include:

- reporting requirements for energy use
- energy intensity targets
- energy efficiency to be achieved
- minimum energy performance standards for new leases
- minimum energy performance for new office buildings or major refurbishments
- energy management strategies to be established
- building management committees to be set up and run.

For more information see www.greenhouse.gov.au/government/index.html

Specific environmental obligations

Specific environmental management or regulatory compliance issues can be included in a lease. Tenants who may have high environmental risk activities can be required to develop and implement an environmental management system (EMS) or plan (EMP) to help them address their environmental risks, achieve environmental targets or goals and demonstrate due diligence.

4 Educate and support tenants

Implement a strategy to educate and support tenants in adopting more sustainable practices. Focus on existing tenants as well as new ones – this might tip the balance in your favour when it comes to renewing a lease. Here are some strategies you might consider:

Provide a Welcome Pack or Building User Guide

Give new tenants comprehensive information about the sustainability performance of the base building and how to use its sustainability features (e.g. how to use external blinds). Provide information on issues of importance to staff such as access to public transport, use of bicycle storage, recycling initiatives, etc. Welcome packs can also be used to encourage feedback as tenants settle in, and tenants can use them as part of an induction pack for new staff.

Provide fitout advice and support

Where new or existing tenants are planning accommodation upgrades or office fitouts, help them by providing advice about integrating sustainability criteria into their plans. Explain that the benefits could include more than utility cost savings. Organisations may find they can boost productivity and attract and retain staff by creating a more vibrant, environmentally friendly and healthy workplace.

Section 4.3 provides advice about sustainable fitouts and engaging tenants, including examples for retail tenants and a case study on GPT's retail tenant engagement initiative. Worksheet 4.3A is a checklist for sustainable fitouts that may be useful for tenants and their design teams.

Monitor tenant performance

Help tenants collect data about energy, water and waste. Some tenants might be reporting their sustainability performance publicly, particularly if they have off-site manufacturing plants. They might not have considered the impacts of their corporate operations and if they are reporting using international standards (e.g. Global Reporting Initiative) they will require specific resource consumption

The Investa Greenhouse Guarantee – an energy saving initiative for tenants

'Investa Property Group provides new and existing tenants with an opportunity to save on energy bills through better energy management. Tenants enter into the Investa Greenhouse Guarantee either by acquiring more energy efficient equipment or by having more substantial energy saving measures built into their fitout. Greenhouse reduction initiatives are identified through a site audit process. The Guarantee sets targets for reduced energy consumption. If the targets are not achieved and extra energy is used, the cost of that extra consumption is refunded to the tenant and GreenPower is purchased to achieve the targeted greenhouse emission reductions.

Launched in 2005, the Guarantee can be included with a standard lease. Under the agreement tenants receive:

- a guaranteed cap on energy bills
- a guaranteed cap on greenhouse emissions
- a NABERS Energy Commitment Rating certificate
- guaranteed NABERS Energy performance ratings
- regular performance reports to help with internal reporting and marketing to staff, clients and other stakeholders.

Savings of up to 20–30% on tenant's energy bills are possible, and capital costs are recoverable within two years. The Guarantee also reduces a tenant's total cost of occupancy. For example, moving from a 0-star rated tenancy to a 5-star rated tenancy can reduce annual energy bills from $\$21/m^2$ to $\$8/m^2$. As at 30 June 2008, Investa had Greenhouse Guarantees covering over 56,000 m^2. This is providing combined annual savings of $245,000 to tenants, and abating approximately 2,400 tonnes of CO_2 emissions per year.'

Investa Property Group, www.investa.com.au

information. Investigate opportunities for separate metering systems, perhaps sharing the cost between the property owner and tenants.

Help tenants become more sustainable

You may be able to help tenants become more sustainable by providing them with access to whole-of-building services that are more cost effective than tenancy-based services. For example, providing shared bicycle storage and showers, conducting waste audits to help reduce contamination in the recycling stream or purchasing GreenPower through the property's energy contract.

Host environmental events and campaigns

Invite tenants to information events about the sustainability performance of the property or planned sustainability upgrades. Host events that are themed around environmental issues e.g. hold a WaterWise Week promoting more efficient use of water in the building.

Encourage tenants to be more sustainable at home as well. For example, tenants might be interested in:

- taking the Australian Conservation Foundation's GreenHome Challenge and calculating their environmental impact using the Eco-calculator: www.acfonline.org.au
- rating their home energy and water use using NABERS: www.nabers.com.au
- visiting 'Our Environment, It's a Living Thing' for more tips and interactive tools: www.livingthing.net.au

Tap in to existing environmental programs and campaigns to help tenants become more sustainable. Examples are provided at the end of this chapter.

5 Measure and report back to tenants

Measure and report back to tenants to demonstrate improvements in the sustainability performance of the property. Report back on:

- trends in energy and water use – use abnormalities as a call to action
- waste and recycling rates – report on other base building recycling initiatives too, e.g. recycling of fluorescent tubes
- improvements in indoor environment quality – explain the links to productivity improvements
- sustainable refurbishment activities in common areas and other tenants' sustainable fitouts – seek out examples showing what can be achieved.

True Green @ Work

Encourage tenants to tap into the many sources of information about making workplaces more environmentally friendly. For example, *True Green @ Work* provides a list of 100 simple ways to improve the work environment: see www.betruegreen.com/files/files/TG%20Work%20order%20form.pdf

Check whether any data you're providing is easy for others to understand (ask a sample group for feedback first, before sending out the report to the whole building). Obtain accredited environmental ratings (e.g. NABERS and Green Star) to provide tenants with third party certification for environmental performance.

Where appropriate provide submetering and report individual tenancy performance.

Your reporting methods could include:

- using newsletters – include environmental tips e.g. turn off computers at power points
- using noticeboards or audiovisual screens in common areas or lifts
- celebrating achievements – e.g. holding a morning tea when targets are met and publicising the improvements.

Encourage feedback from tenants through targeted surveys relating to, for example, indoor environment quality (see Section 3.8) or through less formal means such as regular discussions between building management and tenants.

Determining your approach – issues to consider

- Is the tenant driven solely by financial criteria? This might influence how you present the business case to secure their commitment.
- Does the tenant publicly promote its sustainability credentials? If so, look for opportunities to support them through their tenancy occupation.
- Could high profile tenants help to drive change in the tenancy market if they were to champion green tenancy ideas? If so, there may be an incentive to build sustainability into the relationship strategy with these prospective or existing tenants.
- Can whole-of-building programs be initiated or improved through multiple tenant cooperation? For example, some waste recycling initiatives may only be viable if a majority or all tenancies agree to participate. If several tenants have made a commitment to participate in a whole-of-building program this might help to convince less aware or less motivated tenants to join in.
- Would a 'green lease' be an effective vehicle for engaging and implementing building owner–tenant environmental initiatives and ensuring more sustainable behaviour?

Smaller carbon footprint for Sydney's foreshore

'The Sydney Harbour Foreshore Authority is actively working with tenants to move towards an 80% reduction in carbon footprint by 2020 for The Rocks, Darling Harbour and Barangaroo. These are the first precincts in NSW to set eco-footprint reduction targets.

Local restaurants, galleries, museums and shops are very supportive, and have participated in workshops provided by the Foreshore Authority on making their businesses more environmentally sustainable. The Foreshore Authority has also carried out an independent audit of the environmental impact of 11 local businesses, looking at water and energy use, transport and waste. This included Amo Roma restaurant, the Museum of Contemporary Art, Done Art and Design, Subway, Sydney Harbour Bed and Breakfast, the Australian Hotel, the Mercantile Hotel, Aurora Exhibitions, and more.

Owner of Amo Roma, Charif Kazal, welcomed the initiative. "People are now very conscious of the environment and this is a positive way to help businesses save money and help the environment,' Mr Kazal said. 'This is also an excellent example of how even heritage precincts such as The Rocks can make changes to improve their sustainability."'

Sydney Harbour Foreshore Authority

Cartridges 4 Planet Ark

'Printer cartridges are made up of a complex mix of plastics, metals and inks and toners. Throwing them into the garbage wastes these resources. By recycling them you'll save energy, water and cut greenhouse gasses. We also guarantee "zero waste to landfill".'

Planet Ark

- What impact does a net or gross leasing arrangement have on your green lease concept? Which option provides you and your tenant with more incentive to reduce energy and water use (and operating costs)?
- Can tenant feedback initiatives be improved? Tenants need to know in advance how and when structured feedback will be gathered so they can canvass their staff and obtain a representative opinion.
- Is there a system in place to inform tenants' suppliers and contractors about the accepted sustainability practices at the property, particularly relating to avoiding contamination of the waste system, handling of hazardous materials or use of vehicles and staff amenities? It should be clear to tenants that their suppliers and contractors accessing the property need to comply with lease rules and obligations.

Campaigns

Here are some ideas for campaigns and initiatives you could encourage your tenants to join, offering to collaborate or support their participation where appropriate.

CitySwitch Green Office

CitySwitch Green Office is a national tenant energy management program run in partnership between the cities of Sydney, North Sydney, Parramatta, Willoughby, Adelaide, Brisbane, Melbourne and Perth, and the Department of Environment and Climate Change NSW and Sustainability Victoria. CitySwitch signatories commit to achieving and maintaining an accredited 4 stars or higher NABERS Energy tenancy rating. NABERS Energy measures and rates a tenancy's actual yearly greenhouse gas emissions using 12 months of energy bills. Practical suggestions to improve office energy efficiency include:

- changing to flat screen monitors
- activating sleep mode on equipment where applicable
- upgrading lighting controls including occupancy sensors and timers
- purchasing accredited GreenPower.

Ask a CitySwitch representative to meet with you and your tenants to explain the program. For more information see www.cityswitch.net.au or phone (02) 9265 9852.

Cartridges 4 Planet Ark

For more information or to register for a free 'Cartridges 4 Planet Ark' collection box visit http://cartridges.planetark.org/involvement/get-invoved.cfm or call the hotline on 1800 24 24 73.

SEE Sustainability @ Work – Australian National University

'The award winning ANUgreen program at the Australian National University in Canberra has sought to change the culture of resource consumption throughout the university through the development of its SEE Sustainability @ Work program ('Social, Economic, Environmental sustainability @ Work' or 'SEES@W').

A key aim of the program is to build the capacity of organisational units within the university to manage and reduce their own ecological footprint, in either an office or lab setting. The program points out the business case for environmental sustainability to managers, provides training and support to interested staff and students, known as 'Green Reps' across campus, to champion environmental issues in their local area, and encourages the incorporation of environmental best practice into business operations.

At its simplest level, Green Reps seek to establish 'green office culture'. This can be by disseminating fortnightly sustainability email updates to colleagues, making sustainability a permanent agenda item at staff meetings, displaying environmental awareness raising posters strategically around the building, and promoting simple competitions to engage their colleagues in more sustainable behaviours.

Beyond this, the SEES@W program provides resources and training to build the Green Reps capacity to foster change, as well as assisting organisational units to undertake an environmental audit, and providing guidance to help implement recommendations.'

For more information about SEES@W visit www.anu.edu.au/anugreen

MobileMuster

Encourage your tenants to use MobileMuster instead of placing mobile phones in the waste bin.

- Provide MobileMuster collection bins and use the free pick up and exchange service.
- Use the resources provided by MobileMuster to promote this campaign (e.g. template media releases, fact sheets, brochures, posters, stickers, screensaver, mouse mats).
- Promote MobileMuster on your website.

For more information see www.mobilemuster.com.au

Earth Hour

On 31 March 2007, more than 2 million Sydney businesses and households turned off their lights for one hour. Earth Hour went international in 2008, and now this event will held at the end of March every year. Find out how your building can continue the good work. This is a great initiative in which you and all your tenants can become involved. Marketing material is available from the event organisers.

For more information see www.earthhour.com

'Cycle to Work' or 'Walk to Work' days

For more information see

- www.walk.com.au/WTW/page.asp
- www.rta.nsw.gov.au/usingroads/downloads/cycling_to_work.pdf
- www.cityofsydney.nsw.gov.au/AboutSydney/ParkingAndTransport/Cycling/CycleFriendlyWorkPlaces.asp

Further information

- Australian Conservation Foundation Green Lease, www.acfonline.org.au/news.asp?news_id=535
- 'Lease Arrangements for Green Office Buildings', Freehills, www.freehills.com.au/1917.aspx
- *Green Lease Guide for commercial office tenants*, Investa Property Group, 2006, www.investa.com.au/Common/Pdf/GreenLeaseGuide.pdf
- *Tenant Energy Management Handbook,* www.nabers.com.au
- *True Green @ Work,* Kim McKay & Jenny Bonnin, ABC Books, 2007, www.betruegreen.com/PageGreen.aspx?element=42&category=1
- *ecologic creating a sustainable future*, Sandra McEwen,Powerhouse Publishing, 2004 (reprinted 2005), www.powerhousemuseum.com/publications/publications_item.php?id=64
- Green Pages Business Directory, www.thegreendirectory.com.au/green-pages/green-pages/green-pages/
- Green Building Council of Australia:'Cleaning checklist for your office', www.gbca.org.au/resources/fact-sheets/cleaning-checklist-for-your-office/682.htm
- Sustainability tips for workplaces: www.livingthing.net.au/WYKD_Main.htm

Worksheets

Review and use these Word documents:

3.3A Building rules and regulations – sustainability clauses

3.3B Green lease checklist

Worksheet 3.3A

Building rules and regulations – sustainability clauses

Use of these inserts

The following example clauses are suitable for using in:

- standard building rules and regulations (or similar) within lease agreements
- induction or operation manuals or other similar information about the base building provided to tenants.

Legal advice should be sought if these clauses are inserted into tenders, contracts or leases.

These clauses may need to be adapted to reflect:

- the scope of sustainable property initiatives available in the building
- the property owner's negotiations with tenants about specific sustainable property outcomes.

Make sure any information provided to tenants by service providers such as managing agents or centre managers (such as Tenant Manuals or similar) contains the same wording or conveys the same meaning.

These clauses do not negate, replicate or replace any other standard clauses and should be read in conjunction with the standard clauses. Care should be taken to ensure there is no conflict or confusion between these clauses and existing standard or non-standard clauses in lease agreements (e.g. in regard to cleaning, lighting, air conditioning or waste removal etc.).

Clause 1 'Sustainable fitout' should be reviewed periodically to ensure it captures all practical requirements and supports both the owner's and tenant's sustainable property management objectives.

Encourage tenants to liaise with you if they wish to discuss an environmental initiative relating to their tenancy or the base building's sustainability performance.

Some owners are requiring tenants to achieve minimum NABERS and Green Star ratings for their tenancies, particularly where the building needs to maintain its own base building environmental rating. The extent to which owners will want or need to require tenants to meet minimum standards will depend on factors including the owner's commitment to environmental performance, the leasing market and the need for the tenant to operate in such a way that their tenancy does not reduce the base building rating.

This is an example only – adapt this worksheet to suit your organisation's requirements.

Sustainability

The property owner is committed to managing this property to achieve a high level of sustainability performance. In particular, the:

- efficient use of energy and water
- minimisation of greenhouse gases
- diversion of waste from landfill
- provision of safe and healthy workplaces.

Tenant's commitments

The tenant ensures all practical measures will be taken to occupy the premises in a manner that supports the property owner's sustainability commitments. Notwithstanding any other rule or regulation stated in this [lease agreement/tenant manual], the tenant [will/is encouraged to] take steps to facilitate the following:

1 Sustainable fitout

The tenant will integrate sustainable design and construction goals into fitouts such that energy is used more efficiently, water efficient equipment and appliances are used, toxic or harmful materials are avoided, indoor air quality is maintained at a high level, and fitout waste is diverted from landfill through waste avoidance and minimisation, reuse and recycling initiatives.

The property owner can provide the tenant with a sustainable fitout guide to help in identifying design and construction measures that will create more sustainable and productive workplaces.

The tenant will obtain an environmental rating in accordance with NABERS Energy and the Green Building Council of Australia's Green Star Office Interiors rating schemes. (Required star rating to be included.)

2 Lighting control

The tenant will ensure staff are aware of energy efficient lighting controls, where provided, and observe the need to switch lights off as early as practical in the evenings.

The property owner is willing to discuss potential measures to enable the Building Management and Control System, where possible, to facilitate efficient energy use within tenant-occupied spaces.

3 Waste and recycling

The tenant is encouraged to adopt waste avoidance and minimisation practices and to use the multi-stream waste and recycling collection system where provided by the property owner.

The property owner is willing to investigate potential changes to the building's cleaning and waste removal activities in order to support the tenant implementing a multi-stream waste and recycling system. Such a waste system could include separation of organics (e.g. food waste), plastic, glass and metal containers from paper and cardboard and from residual waste (to landfill). If the tenant wishes to investigate the viability of on-site organic recycling, such as a worm farm, the property owner is willing to discuss the contribution it could make to such an initiative. The owner is also willing to investigate installing a system where the different waste streams can be weighed at an off-site location. (Major tenants may require their waste to be weighed.)

Include instructions on recycling including:

- what can be recycled
- where the recycling storage areas are
- schedules for waste and recycling removal, e.g. cyclical dates on which certain materials, such as e-waste, can be recycled.

4 Energy and greenhouse gas minimisation

The tenant will ensure that it designs, constructs and occupies its premises in such a way that avoids:

- the inefficient use of energy through unapproved manipulation of the property owner's heating, ventilation and air conditioning controls and lighting
- opening windows in extreme weather conditions
- propping open external doors
- overusing lifts where stairs provide a viable alternative
- unnecessary use of lighting
- non-use or misuse of internal blinds or sun control devices provided by the property owner.

Where supplementary air conditioning is required, the tenant is encouraged to select energy efficient equipment.

Computer equipment with active energy efficiency modes is highly recommended. Staff should be trained to turn off computers and other equipment when not in use.

Only energy efficient kitchen water heaters are allowed, with thermostats set to avoid scalding and timers to restrict operations to business hours.

The tenant is encouraged to consider assessing its energy use against the NABERS Energy scheme with a view to achieving a high greenhouse star rating.

5 Water conservation

The tenant is to advise property management immediately of the need to repair or adjust leaking taps, toilet cisterns or urinals provided by the property owner and to similarly promptly attend to leaks in taps or water using equipment provided by the tenant.

Where provided and maintained by the tenant, landscaped areas and planter boxes are to use drought-tolerant species and avoid over-watering by manual or automatic irrigation

systems. Taps, shower fittings and dishwashers with minimum 4 star WELS rating are only to be used.

6 Indoor air and environment quality

The tenant, or any employee, agent, contractor or subcontractor of the tenant, shall not undertake any activity that is likely to or has the potential to adversely affect indoor air quality and environment quality (e.g. noise) either within the premises or elsewhere in the property.

The tenant is to seek written approval from the property owner or the property owner's agent should such activity be likely or unavoidable before any such work is undertaken. Such work should be scheduled for weekends only.

7 Occupant safety

The tenant is to immediately advise the property owner, or the property owner's agent, of any potential risk to occupant safety either within the premises or elsewhere on the property, and is to take steps as necessary to ensure staff, visitors or contractors are aware of the risk or hazard.

8 Transport

The tenant is encouraged to promote the use of public transport to staff and regular visitors. The property owner has provided [secure bicycle storage facilities in the basement / and / common showers for bicycle users] to facilitate bicycle commuting by building occupants. The property owner is willing to discuss further measures that the tenant may wish to take to promote bicycle and public transport alternatives.

Provide local public transport information, maps and timetables, and details or links on alternative methods of transport to the workplace, such as carpooling.

9 Compliance

The tenant is to comply with all applicable environmental and health and safety regulations and requirements of Local, State and Commonwealth Government origin.

Property owner's commitments

10 Sustainability commitment

The property owner will operate and manage the base building to achieve a [insert desired outcome e.g. 4.5-star NABERS Energy/3.5-star NABERS Water /4-star Green Star etc.] rating as determined and formally verified by the relevant industry bodies.

11 Monitor and report sustainability performance

The property owner will ensure the base building sustainability commitment made in [clause 10] will be monitored and performance disclosed regularly. This commitment will be independently verified.

12 Capped energy and greenhouse

The property owner will offer the tenant a capped energy or greenhouse emissions consumption commitment over a fixed period of time, with tenant costs incurred over the agreed cap to be refunded by the property owner.

13 Tenant and property owner's joint commitments

To establish an Environmental Management Committee comprising representatives of the property owner and tenants. The purpose of the committee is to:

- Monitor and improve the environmental performance of the building in accordance with criteria and rating targets
- Monitor and improve the tenants' operations within the building
- Enable the property owner and tenants to optimise their combined environmental performance, and the building's environmental performance, through collaboration
- Initiatiate improvement in environmental performance as standards change
- Review upgrades and improvements planned, faults, occupational health and safety and other requirements
- Provide guidance to the property owners with regard to environmental improvements.

Environmental performance criteria includes, but should not be limited to:

- energy efficiency
- water efficiency
- waste efficiency
- indoor environmental quality
- transport
- emissions
- management systems
- materials
- building efficiency for future improvements in the environmental performance of the building and tenancy.

For additional information see:

- NABERS, www.nabers.com.au
- Green Building Council of Australia Green Star rating tools, www.gbca.org.au/green-star/rating-tools/
- Energy Efficiency in Government Operations (EEGO) www.environment.gov.au/settlements/government/eego/index.html

Worksheet 3.3B

Green lease checklist

In addition to conventional lease components, the following potential inclusions in a commercial property green lease are based on information provided by Australian law firm Freehills and the Corporate Realty, Design and Management Institute of America (www.squarefootage.net).

This is an example only – adapt this worksheet to suit your organisation's requirements.

	Responsibility placed on:		
	Property owner (base building)	Tenant (tenancy)	Both
Targets and benchmarks			
Measurable environmental performance targets and benchmarks are clearly identified and disclosed e.g. 4.5 star NABERS Energy, 5 star Green Star, 4 star NABERS Water, 4 star NABERS Waste or other sustainable property benchmarks.	✓	✓	✓
Separate energy and water metering is provided.	✓		
Base building and tenancy water and energy consumption and greenhouse gas emissions are independently monitored and reported – levels and compliance with targets and benchmarks.			✓
Agreed penalties apply for failing to comply with lease obligations or targets.			✓
Targets are set for minimising waste and increasing recycling.		✓	
Utility bills and greenhouse emissions are capped and tenants receive achievement rewards.			✓
Tenant's environmental obligations and opportunities			
Environmental and social obligations are included in building rules		✓	
A property Environmental Management Plan (or similar) is in place.	✓		
Accredited GreenPower products are purchased.			✓
Liaison with property manager in regard to tenancy or base building maintenance is prompt.		✓	
Tenancy fitouts			
Property owner and tenant require specific environmental design and construction standards and tenancy environmental performance (potentially to a target rating, such as noted above).			✓
Fitout policy includes environmental targets.		✓	
Sustainable fitout advice and guidance is provided to tenant.	✓		
Property owner's environmental obligations and opportunities			
Energy, water and waste performance are regularly audited and disclosed to tenants.	✓		
All fundamental building elements, services and systems are installed and operated with maximum efficiency.	✓		

	Responsibility placed on:		
	Property owner (base building)	Tenant (tenancy)	Both
Response to base building and tenancy performance issues is prompt.			✓
Indoor air quality is [good/excellent].	✓		
Use of CFCs in air conditioning systems is banned	✓		
Smoking in the building and in building surrounds is banned.	✓		
An easily accessible, dedicated and streamed waste and recycling area is provided.	✓		
Checks are in place to ensure recyclable material is actually being recycled.	✓		
Air conditioning levels are monitored and adjusted where necessary to reduce energy use and meet comfort requirements.	✓		
Sufficient bicycle storage and change rooms with showers are provided.	✓		
A sufficiently comprehensive building management and control system (BMCS) that supports real-time monitoring of thermal, energy and water performance of the base building and tenancies is in operation.	✓		
Other components			
Where agreed, clear dispute resolution procedures are supported by an independent annual audit of targets and environmental performances.			✓
Communication between tenant and property management is effective and regular.			✓
Gross lease format applies, with an appropriate escalation clause and expense stop clause to reward the property owner for operating a high-performance building.	✓		
Appropriate operational procedures and BMCS are in place for charging tenants for after-hours or excess energy usage.	✓		
Building operating costs have been comprehensively and equitably defined to protect the interests of the property owner and tenant.	✓		
Terms have been agreed allowing the property owner to amortize the costs of projects that will reduce operating costs and treat those amortization costs as operating costs, as long as they do not exceed savings.	✓		
A 'right to audit' clause is in place, protecting the tenant from overcharges and defining the audit process to protect the property from frivolous audits.			✓
A definition has been established for what constitutes a hazardous material.	✓		
A 'green' cleaning specification (or similar) details the environmental procedures, materials and protocols for cleaning the building in a sustainable manner.	✓		
A 'Tenant Manual and Development Guidelines', or similar, clearly explains the building's sustainability features and the responsibilities of both parties to be aware of correct operating requirements.	✓		

Assessing sustainability performance

3.4

Context

This section explains how to assess your property's sustainability performance and use sustainability benchmarking as an invaluable management tool.

Successful sustainable property management is underpinned by comprehensive knowledge about asset performance and comparisons with industry-recognised benchmarks for best practice. Benchmarking can help you to establish targets for improvement and an action plan for achieving those targets. Choosing the appropriate benchmarks depends on what you are trying to achieve. For example, you might want to:

- benchmark the building's performance internally i.e. across your portfolio
- compare your building's performance against its competitors
- identify improvement targets
- demonstrate your building's performance to stakeholders, e.g. shareholders or tenants
- report performance as part of your governance processes
- report performance against regulated reporting requirements.

Assessing and managing sustainability performance requires a strategy for comprehensive data collection, monitoring and evaluation. Data collection can be linked to existing performance monitoring and reporting practices. It's vital that systems are set up so that future monitoring and management responses can be replicated for each reporting period and become standard practice.

What's in this section

Sustainability at acquisition

For information about assessing property sustainability at the acquisition phase see Section 3.2: 'Sustainability and property acquisitions'.

Steps: Assessing performance

1 Measure baseline performance

Gather data for your property baseline analysis. You could use the data template in Worksheet 3.4A as a guide. Some of this information can be obtained from building management and control systems and utility records, while other aspects will require a site inspection and dedicated monitoring.

This process will increase your knowledge about the physical characteristics of the building that influence its sustainability performance, and will identify data gaps that need to be addressed.

Portfolio performance

Develop a profile of your portfolio and identify the best performers. Determine the average portfolio performance and use this as a basis to measure incremental improvement across the portfolio due to program-specific initiatives. Use your portfolio profile to identify poor performers and look for opportunities to adopt good practices from one property across your portfolio. This is particularly relevant where your portfolio uses multiple managing agents.

2 Benchmark performance

Identify performance criteria you would like to benchmark against. The most important aspect of benchmarking is comparing the building's sustainability performance to others in the market. This gives a good indication of relative performance, not just internal performance.

Evaluate your performance

Compared to the benchmarks:

- How does your building or portfolio rate?
- What percentage of your portfolio is below or above average?

Use your benchmarks to set improvement targets and to identify properties that may need immediate action.

Self-assessment

You can self-assess building environmental performance at no cost using the NABERS performance rating calculator (see www.nabers.com.au). The calculator can be used to rate base buildings, tenancies and whole buildings.

Evaluating the portfolio

'Commonwealth Property Office Fund undertook a portfolio-wide evaluation to identify and establish its baseline across a number of environmental, social and other risk parameters. The identification of strong and weak assets, as well as the portfolio average performance, improved the exchange of information between asset managers and property managers, and improved the ability to introduce program-specific initiatives, and set and track targets during future asset upgrades and acquisitions. It also provided a basis for comparison against industry benchmarks and between similar building portfolios.'

Colonial First State
Global Asset Management 2008

Setting their own benchmarks

Several commercial property owners are setting their own performance goals. For example, in 2008 Stockland set a target of 8% reduction in electricity consumption and greenhouse gas emissions for its Australian office portfolio.

Stockland, www.stockland.com.au

Self-assessment can help you get a rough idea of performance, but you need to be careful that the information you enter is as accurate as possible and conforms to the data needed by the calculators.

For example, if you're using the base building energy calculator, the area should be based on the net lettable area (NLA) minus spaces that can be excluded (e.g. retail areas in an office building) and the energy usage data needs to relate only to the part of the building being rated, e.g. the base building. If the information you enter is not accurate (e.g. using the number of computers on the asset register instead of the number of frequently used computers) the results can be misleading. If you are uncertain about self-assessment look for further information on the NABERS website or seek advice from a NABERS Accredited Assessor.

Accredited assessment

To ensure the accuracy of the results you obtain, and to use the rating to promote your property or organisation, or to use the NABERS trademarks, you must obtain a certified rating from a NABERS Accredited Assessor. Make sure you use an assessor with good knowledge of sustainability practices in both commercial property design and management. A list of assessors is available at www.nabers.com.au. An Accredited Assessor can also give you general advice or help you with an unofficial self-assessment.

Renewing your rating

Make sure your rating is kept up-to-date otherwise you may be communicating false information to the market place.

3 Set performance targets

Now that you have established your baseline performance, set firm improvement targets with milestones for action. Targets should relate to your organisation's sustainability goals and should be practical and achievable at a stretch. You may wish to articulate your commitments and targets in your organisation's sustainability policy (See Section 2.3: 'Developing a sustainability policy for your organisation'.)

When setting targets ask the following questions:

- How do your targets compare with those of your peers?
- Have you informed your internal and external stakeholders of the targets? Do they meet the stakeholders' current and future expectations?
- Can you verify progress in relation to the targets?

NABERS range of tools

NABERS provides a range of tools for benchmarking performance:

- **NABERS Energy** – available now for office and hotel buildings and shortly for retail properties. NABERS Energy was previously known as the Australian Building Greenhouse Rating (ABGR). Ratings are available for base buildings, tenancies and whole buildings.
- **NABERS Water** – available now for office and hotel buildings and shortly for retail. Ratings are available for whole buildings.
- **NABERS Waste** – available now for office buildings. Ratings are available for base buildings, tenancies and whole buildings.
- **NABERS Indoor Environment** – available now for office buildings.
- **NABERS Transport** – available shortly for office buildings.

Using your NABERS rating

You can use an accredited NABERS rating:

- as a marketing tool to attract tenants e.g. to satisfy government tenancy requirements
- to report building improvements in non-technical terms, e.g. 'We achieved a 1-star NABERS Energy improvement'
- to report performance in an internal or external sustainability report
- to participate in recognition programs e.g. CitySwitch Green Office (previously the 3CBDs Greenhouse Initiative), see www.cityswitch.net.au

www.nabers.com.au

Allocate responsibility for achieving the targets. Where applicable, integrate the targets and minimum standards into service or performance contracts with relevant service providers and staff performance agreements.

Make sure your targets are not numbers hidden in a report. Make them part of 'business as usual' operations. Promote targets to key stakeholders to ensure they understand the process you have committed to and the intended benefits.

4 Develop a sustainability action plan

Develop an action plan to improve your sustainability performance and achieve your targets. The action plan should identify responsibilities and timeframes for action.

Your plan should provide for:

- systematic implementation of initiatives
- monitoring actual performance against targets
- inspection, maintenance and cleaning schedules
- data collection and management
- reporting of outcomes.

Work out what measures need to be undertaken, and when. Assess each action against the business case to determine if the initiatives are:

- short-term opportunities, i.e. actions having a short payback period (typically less than 3 years) or yielding significant energy savings
- medium-term opportunities, i.e. actions having a payback period of 3 to 5 years, most likely involving changes in building maintenance and operational procedures
- long-term opportunities, i.e. actions having a payback period of 5 years or more, involving capital upgrades and refurbishments and therefore requiring budget allocations over a number of years.

Also identify whether the actions will require collaboration with tenants, e.g. refurbishment activities and fitouts.

Give priority to actions that will create long-term value by permanently reducing outgoings or achieving significant environmental savings such as lower greenhouse gas emissions.

Improvements that can be integrated into scheduled cyclic maintenance or capital upgrades may have a better chance of being implemented than one-off projects funded through operational budgets.

Setting your targets

Setting targets needs careful consideration:

- Targets should be quantifiable and measurable, rather than generic, e.g. 'reduce energy use by 15%' rather than 'save greenhouse gases'.
- Targets should require a stretch, but be achievable.
- Link targets to an indicator that reflects the level of activity within your organisation, e.g. base them on occupancy rates.
- Set the timeframe. Choose the base year and define the commitment period and completion date.
- Define the target boundaries.
- Set overall business targets, but also break down overall targets so they relate to specific business units, e.g. areas of intensive resource use.
- Involve end users and foster their sense of ownership.
- Assign specific accountabilities for delivering each target – to senior managers with appropriate levels of authority to control the process of achieving the target.
- Track and report on progress.
- Review targets periodically.

Adapted from *The Greenhouse Gas Protocol: A Corporate Accounting And Reporting Standard*, 2001, World Business Council For Sustainable Development and World Resources Institute

Focusing on energy, water, waste, indoor environment quality and refrigerants

Sections 3.5, 3.6, 3.7, 3.8 and 3.9 provide information about actions that can be undertaken to improve management of energy, water, waste, indoor environment and refrigerants.

Identify improvement initiatives

Once you have identified areas of poor performance, some opportunities for improvement will be readily actionable, and should be included in either maintenance programs or future upgrade or refurbishment projects.

To access the latest Australian research on improving the built environment, visit the Your Building portal at www.yourbuilding.org/display/yb/Home

5 Collect data and monitor performance

Put in place systems, or modify existing systems, for collecting accurate data for your sustainability indicators, including your target benchmarks. Existing building management and control systems (BMCS) may provide some data but are unlikely to provide all the data you'll require. You may need to set up or modify monitoring practices that involve electronic and other means of data collection.

When designing your monitoring system, make sure key tenants or resource intensive areas can be submetered, e.g. retail, food courts, fitness centres, carparks and HVAC equipment.

Evaluating your data

Make sure the data is not just being collected but is being used. Evaluate your building or portfolio against the selected NABERS rating or other benchmarks that are appropriate for your building. (Refer back to Step 2.) If you are submitting your building for an accredited rating you should work closely with your Accredited Assessor from the outset.

Remember to:

- check that you have the right documentation and data
- be aware of the timeframes required to get a rating
- after your first rating, make sure the correct data is collected as a matter of routine operation to ensure quicker, easier and cheaper subsequent ratings.

Set up processes where data is evaluated on a regular basis – preferably monthly. The problem with less frequent data analysis is that by the time you recognise a problem it might be too late to do some minor rectification works. Monthly monitoring also allows you to make subtle changes to the operation of the building and quickly determine if the results are as anticipated. Make sure there are targets for each measurement so you know if each one is where it should be.

www.yourbuilding.org

The Your Building web portal is a knowledge bank of information about ownership, design, construction, occupation and operation of sustainable commercial buildings.

The portal consolidates available knowledge on sustainable buildings and provides links to the websites of leading organisations and further web reference material. Through case studies and research findings it demonstrates the economic, environmental and social benefits of creating sustainable buildings, and provides up-to-date information on ratings systems and performance measurement.

The portal was created by the Cooperative Research Centre (CRC) for Construction Innovation in partnership with the Australian Sustainable Built Environment Council (ASBEC) and the Australian Government Department of the Environment, Water, Heritage and the Arts.

www.yourbuilding.org/display/yb/Home

Check your data

See the sidebar on page 6 of this section about checking your data and working out the best fit between collecting data and meeting people's data requirements.

6 Update building maintenance and operational procedures

Review building maintenance and operational procedures to make sure that sustainability measures are a routine part of everyday activities. Check that:

- poor equipment maintenance is not causing issues; for example, filters that are not cleaned regularly can increase energy consumption and create poor indoor environment
- standard building operating procedures are not causing problems in other areas; for example, closing outside air dampers slightly may improve energy consumption in some circumstances but may also contribute to poor indoor environment
- sensors are calibrated so systems are working as designed
- control loops are fine-tuned for seasonal variations
- temperature set points are suitable for efficient operation and tenant comfort
- tenant complaints are dealt with in a timely manner and the basic cause of the issue is dealt with, rather than making a small area acceptable and possibly causing problems in other areas.

7 Integrate sustainability into contracts

Review major contracts to identify potential rewards for sustainability initiatives. Build sustainability requirements into other contracts such as maintenance, controls and subcontractors working on site. Make sustainability a key performance indicator for maintenance and controls contracts. This must be measurable and deliverable.

Check your purchasing contracts to make sure sustainability is a key factor in product and supplier selection. Refer to Section 5: 'Sustainability and the Supply Chain'.

8 Report performance monthly

Build sustainability management into regular base building reporting. Ensure monthly reporting tracks performance against sustainability targets. Investigate variations or unusual events. Include performance monitoring results in your monthly property sustainability report. You could use Worksheet 3.4C: 'Monthly property sustainability report' as a guide, or adapt this to integrate it into your existing monthly reports.

At team meetings discuss monthly performance and the measures taken to maintain or adjust building services so they make the best contribution to meeting your targets.

Check your data

Make sure the data you collect:

- is accurate and can be reported monthly at least
- can be verified – especially if third party verification is required
- can be used for external benchmarking – check with the NABERS website or your Accredited Assessor to make sure your data is useful for evaluating and achieving your NABERS targets.

Work out the best fit

Work out the best fit between the demands imposed by collecting and verifying data and the expectations of the people requiring the information. BMCS vary in complexity and usefulness. They are often under-used or not well understood, and information obtained rarely reaches property owners, let alone tenants.

Sophisticated diagnostic or 'real time' monitoring and reporting systems that can report inefficiencies in building services and prompt management responses are becoming increasingly available.

9 Engage tenants

Regularly engage with your tenants to support them in improving their own sustainability, and keep tenants up-to-date on the performance improvements you are working on. Make them a part of the process and let them know how you are improving their building. Encourage tenant's staff and key contractors to improve their sustainability as well, by working through a similar process to the one you are undertaking. See Section 5: 'Sustainability and the Supply Chain'.

Engage tenants on projects that will help to improve the overall performance of the building. Encourage them to rate their own tenancy performance by obtaining a NABERS tenancy rating. Help them to improve their tenancy ratings. See Section 3.3: 'Tenant engagement and green leases'.

10 Review performance annually

Undertake an annual performance review to track your property sustainability trends. You could use Worksheet 3.4D: 'Annual resource efficiency review' as a guide. Review your sustainability trends and ask yourself:

- How have you progressed against your targets?
- What can you do over the next 12 months to improve performance?

Public reporting of your performance is the key to ensuring accountability and a positive corporate reputation amongst your stakeholders. Your annual review and report should include official, accredited NABERS ratings. This gives stakeholders confidence that the reported standards are reliable, and that you are committed to achieving the targets you have established. Update your sustainability action plan once you have completed your review.

Tenants' sustainability initiatives

Areas to work on with tenants include:

- turning computers, office equipment and lights off when not in use
- reducing waste generation and optimising opportunities for recycling
- using sustainability as a major criteria when purchasing equipment
- encouraging tenants to make sustainable material choices in their fitouts, such as specifying low-VOC paints.

For more information about working with tenants on sustainability see Sections 3.3: 'Tenant engagement and green leases' and 4.3: 'Sustainable fitouts'.

Further information

- National Australian Built Environment Rating System (NABERS), www.nabers.com.au
- Green Building Council of Australia (GBCA), Green Star rating scheme, www.gbca.org.au
- CitySwitch Green Office (previously the 3CBDs Greenhouse Initiative), see www.cityswitch.net.au
- Your Building portal: www.yourbuilding.org/display/yb/Home
- Property Council of Australia, www.propertyoz.com.au
- Australian Performance-based Building Network, www.auspebbu.org

Worksheets

Review and use these Word and Excel files:

3.4A Property sustainability data template

3.4B Portfolio sustainability data template

3.4C Monthly property sustainability report *(Excel)*

3.4D Annual resource efficiency review

Worksheet 3.4A

Property sustainability data template

The following template can help you develop a baseline for your building and should be undertaken with the help of a technical specialist. This worksheet includes both office space and retail space. This is an example only – adapt this worksheet to suit your organisation's requirements, and delete sections not relevant to the property under review.

Section A: Property details

Building/Centre name		City	
Street address			
Building age			

Size:		Building functions:	
No. of levels (excluding basement)		Office space	m^2
Gross floor area	m^2	Retail	m^2
Building net lettable area (NLA) incl. vacancies	m^2	Food outlets	m^2
No. of car parking levels (or area in $m^{2)}$		Carpark	m^2
Basement size	m^2	Other (list)	m^2
No. of car parking spaces			m^2
No, of disabled parking spaces			
No. of lifts, escalators and travelators			

Office tenancy			**Occupancy/use**	
Major tenants	% NLA occupied	No. staff	Total no. building occupants (excl. visitors and building contractors)	
			Standard weekly hours of operation	
			No. of floors with 24/7 operation	
			% vacancy (at time of assessment)	
No. of tenancies:				

Retail capacity			**Occupancy/visitation**	
	Number	GLAR	Hours of annual occupancy	
Specialty tenants			Annual total visitation	
Major tenants			Peak visitation (people/day)	
No. of tenancies			Standard weekly hours of operation	
% vacancy (at time of assessment)			No. of levels with 24/7 operation	

Industry benchmarks				
NABERS Rating	Base	Tenancy	PCA Office Quality Grade	
NABERS Energy			Green Star Rating (specify tool used)	
NABERS Water		n.a.		

NABERS Waste				

Building management	
Are 'green leases' used for tenancies?	
Is there an Environmental Management Plan in place for the building, and in use?	
Does the Building Fitout Guide include green clauses and standards?	
Does the Building Users Guide include good environmental practice?	
Is there a Building Environmental Management Committee in place? Meeting regularly?	

Transport and accessibility

Distance from bus stop	m	Disabled toilets on each occupied floor	Y/N
Distance from train station	m	Estimated workforce using public transport	%
Distance from public carpark	m	No. designated motor bike spaces provided	
Disabled access from street to lift lobby	Y/N	No. designated bicycle spaces provided	
Disabled access from carpark to lift lobby	Y/N	No. shower facilities for cyclists	

List specific facilities for disabled accessibility (e.g. lifts, toilets etc.):

Notes regarding source and quality of information and data included in this evaluation:

Section B: Property performance

Note: per m^2 means per square metre of NLA

Energy

Note: In WA, SA and QLD include information on energy resold.

20XX/20XY energy consumption			
	Units	**20XX**	**20XY**
Total electricity consumption base building house light and power	kWh		
	kWh/m^2		
	MJ/m^2		
Basement light and power (if known)	kWh		
	kWh/m^2		
	MJ/m^2		
Total gas consumption	MJ		
	MJ/m^2		
Lift electricity consumption (if known)	kWh		
	kWh/m^2		
HVAC electricity consumption (if known)	kWh		
	kWh/m^2		
After hours HVAC electricity (if known)	kWh		
	kWh/m^2		
Total heating (if known)	MJ		
Total hot water (if known)	MJ		
Total other fuels used on site e.g. diesel	Lt		

20XX/20XY energy costs			
	Units	**20XX**	**20XY**
Total electricity supply cost base building house light and power	$		
	$ /m^2		
Total gas supply cost	$		
	$ /m^2		
Total other fuels supply costs	$		
	$ /m^2		

Comment on any aspect of energy consumption and cost of energy supply.

Monthly performance (base building)	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**
Electricity consumption (KWh)												
Peak demand (KW)												
Electricity costs (total $)												
Gas consumption (MJ)												
Gas costs (total $)												

Is there an Energy Management Plan (or similar) in place? If so, include a copy with this evaluation.	

Briefly describe the HVAC system and its key components including any energy saving features.	Number	Type	Capacity	Age
• boiler plant				
• chiller plant				
• cooling towers				

• air handling systems				
• water reticulation systems				
• air filtration systems				
What are the outside air flow rates (L/s)				
How many occupants is the air conditioning serving?				
Does the air handling plant have high efficiency filtration?				
Are air filters regularly inspected and changed?				
Are there any supplementary AC systems? If so, describe capacity and use.				
Are there shut-off valves on condenser water supply (tenant)?				
Describe the carpark/basement ventilation system.				
Is carbon monoxide monitoring provided?				
Describe the domestic hot water systems installed in the building.				
Briefly describe the scope of the A/C control systems:				
• type (e.g. pneumatic, electronic, DDC)				
• control of HVAC systems				
• economy cycles				
• night purge				
Is power factor correction installed in the building? If so, provide details.				
List scope of energy submetering systems i.e.:				
• house power				
• lifts				
• mechanical				
• carpark				
• gas				
Are these monitored on a monthly basis? Provide reports if available.				
Is the building exposed to significant western sun?				

Is there sun shading on exterior windows or internal blinds?	
Briefly describe the lighting system including energy saving features:	
• tenant controls	
• lighting controls	
• types of luminares	
• lighting zones (size in m^2/number/ floor)	
• dimming systems	
• after-hours controls	
Do cleaners turn off the lights at night?	
Has an energy audit been undertaken in the last 5 years? If so, provide copy.	
Add any comments on energy information provided.	

Greenhouse emissions, ozone depletion and global warming

	Units	20XX	20XY	
Total GHG emissions	kg $CO_{2\text{-}e}/m^2$			
Quantity of each refrigerant type used in A/C (if desirable attach a refrigerant register including quantity stored on premises):				
Is a refrigerant leak detection system installed?				
What is the limit of detection (e.g. < 100 ppm)?				
Does the system monitor the refrigerant stockpile?				

Water and Wastewater

	Units	20XX	20XY		Units	20XX	20XY
Total water consumption (mains supply)	kL			Cost of mains water	Total $		
	kL/m^2				$/kL		
Total water consumption (other supply e.g. rainwater collection)	kL			Cost of effluent discharge	$		
					$/$m^2$		
Water recycled	kL						

Quarterly performance	(20XX) July to Sept	Oct to Dec	Jan to March	April to June
Consumption (kL)				
Supply costs				

Toilets			**Urinals**		
Flush volume	**No. of women's**	**No. of men's**	**Type**	**No.**	**Flush volume**
6/3 L dual flush			Timed flush		
9/4.5 L dual flush			Manual flush		
6 L full flush			Sensor-operated flush		
9 L full flush			Waterless		
11 L full flush			Other		

Showers		**Basins in amenities**		
No.	Flow rate (L/min)	No.	Tap type	Tap flow rate (L/min)

Storage tanks			**Cooling towers** **No. of towers:**			
Capacity (kL)	No.	Location/use	Type	Cycles of concentration	Refrigeration capacity (kWh)	Operating times

NABERS Water rating (if assessed)	Rating:
	kL/m^2/pa:
Has a water audit been undertaken in the last 5 years? If so, provide a copy.	
Are submeters installed to monitor major water consuming equipment? If so, provide a breakdown of % of total water use for each metered component.	
Are these submeters connected to a stand-alone system for monitoring?	
Is there an irrigation system installed? If so, specify time/week, minutes/session and flow rate.	
Are water devices such as ball floats in cooling towers and make-up tanks checked and maintained on a regular basis?	
For cooling towers, is water make up metered?	
Is bleed-off from cooling towers also metered?	
Have any water leaks been identified and fixed in the past year. If so, specify.	
List any water-saving devices used in the building (e.g. flow restrictors, low-flow shower heads, automatic taps etc.)	
Is there a system in place where water can be recovered for reuse?	

Is stormwater or rainwater collected and stored for use on site? If so, describe storage capacity and use.	

Waste

	Unit	20XX	20XY		Unit	20XX	20XY
Total solid waste sent to landfill	T			Annual cost of waste collection sent to landfill (collection, transport and tip fees)	$		
					$/m^2		
Total paper and cardboard waste collected for recycling	T			Annual cost of paper and cardboard collection and removal	$		
					$/m^2		
Total other recyclables (e.g. co-mingled containers)				Annual cost of other recyclables collection and removal	$		
					$/m^2		

NABERS Waste rating (if assessed)	Rating:
	g/person/pa (if applicable):
	% recycled:
Is there a Waste Management Plan in place (or similar), e.g. waste minimisation strategy, to reduce waste going to landfill (e.g. increase recycling)? If so, provide a copy.	
Has a waste audit been undertaken in the last 5 years? If so, provide a copy.	
Describe the waste recycling system in major tenancies e.g. plastics, paper & cardboard, organics etc.	
Describe the waste recycling systems or infrastructure (e.g. compactors) for the base building e.g. plastics, paper & cardboard, organics etc.	
Describe any additional waste recycling or collection systems provided for other materials e.g. fluorescent tubes, batteries, mobile phones, construction & demolition waste, furniture, electrical equipment etc.	
Are there any planned or desired improvements to waste management to reduce waste to landfill? If so, describe.	

Indoor Environment

	Unit	20XX	20XY		Unit	20XX	20XY

NABERS Indoor Environment rating (if assessed)	Rating:
Is there an Indoor Environment Management Plan in place (or similar), If so, provide a copy.	

Has an IE audit been undertaken? If so, provide a copy.	
Describe the IE systems or infrastructure	
Describe any additional IE initiatives	
Are there any planned or desired improvements to IE management? If so, describe.	
Have air quality tests been undertaken? If so, what actions have been implemented to improve indoor air quality?	

OH&S/access	**20XX**	**20XY**
Total reported incidents		
Successful compensation claims against building owner or managing agent		

Have risk management procedures been implemented on this property?	
Are contractor management procedures in place?	

Disabled access	Compliant	Non-compliant
Points of entry:		
• main		
• rear		
• side		
Emergency exits		
Toilets		
Foyer		
Upper levels		
Lifts		

Lease characteristics

List number of leases per type:	Gross	Semi-gross	Net

Are all major tenants on net or gross leases?	
Lease expiry profile (provide if available)	

Contractors and suppliers

Are contractors and suppliers screened for competency regarding sustainability e.g. environmental experience, environmentally friendlier products, ISO 14001 system in place, waste avoidance, low-emission products, staff training etc. If so, describe.	

Refurbishment history

When was the building last upgraded or refurbished? List key improvements. (building services, façade, common areas etc.)	

Describe any upgrades planned and or budgeted for? e.g. BMS, chillers, cooling towers, air handling units, lighting systems, floor refurbishments, make good, switchboards etc.	
What failures in building services have occurred in the past 2 years? Describe incidents and likelihood of re-occurrence.	

Worksheet 3.4B Portfolio sustainability data template (A3 page size)

Fund/portfolio name:

Period of assessment: 20XX – 20XY *(Financial year)*

Use this spreadsheet to aggregate data across a fund or portfolio so you can identify baseline performances over various sustainability criteria. Data may be collected using Worksheet 3.4A: 'Property sustainability data template'. This is an example only – adapt this worksheet to suit your organisation's requirements.

Property information	**Building number (for this assessment)**	**Example**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	Name and address of each property	Example office building								
	State	NSW								
	Age (years)	18								
	NLA (m^2)	19,917								
	Basement (m^2)	5,500								
	No. Occupants (average over period)	905								
	Average occupant density (based on 1 person/15m^2 NLA)	1,328								
	Managing Agent	Name								
Electricity Offices (NLA)	Total annual electricity consumption in offices (kWh)	2,054,976								
	Total annual electricity consumption in offices (MJ)	7,397,914								
	Total annual electricity supply cost ($)	211,178								
	Electricity efficiency (MJ/m^2/year)	371.44								
	Fund/portfolio average (MJ/m^2/year)	404.00								
	Electricity annual total supply cost ($/$m^2$/year)	10.60								
	Fund/portfolio average cost/m^2 ($/$m^2$/year)	0.00								
	Property Council of Australia (PCA) lower quartile ($/$m^2$/year)	9.53								
	PCA median ($/m2/year)	11.57								
	PCA upper quartile ($/m2/year)	13.76								
	Electricity (MJ/person/year)	8,174.49								
	Comparison fund/portfolio average (MJ/person/year)	0.00								
	Electricity ($/person/year)	233.35								
	Comparison fund/portfolio average ($/person/year)	0.00								
Carpark & basement	Total electricity consumption (if metered) (kWh)	42,500								
	Total electricity consumption (if metered) (MJ)	153,000								
	Total electricity supply cost (if known) ($)	49,950								
	Electricity efficiency (MJ/m^2/year)	27.82								

	Electricity cost ($/m^2/year)	9.08								
Combined offices, carpark & basement	Total electricity consumption (kWh)	2,097,476								
	Total electricity consumption (MJ)	7,550,914								
	Total electricity cost ($)	261,128								
	Total electricity consumption efficiency (MJ/m^2/year)	399								
	Total electricity cost efficiency($/m^2/year)	19.68								
	Total electricity efficiency per person (MJ/person/year)	8,174.49								
	Total electricity cost per person ($/person/year)	233.35								
Electricity generation on site	Total generation capacity (kWh)									
	Percentage of total annual electricity consumption (%)	2								

Gas Offices	Total gas consumption (MJ)	4,739,995								
	Total gas cost ($)	41,025								
	Gas use efficiency (MJ/m^2/year)	238								
	Fund/portfolio average energy efficiency (MJ/m^2/year)									
	Gas supply cost efficiency ($/m^2/year)	2.06								
	Fund/portfolio average cost efficiency $/m^2/year									
	Gas use per person (MJ/person/year)	5,237.56								
	Comparison fund/portfolio average (MJ/person/year)									
	Gas cost per person ($/person/year)	45.33								
	Comparison fund/portfolio average ($/person/year)									

Total energy for the building	Total energy (MJ)	12,290,909								
	Total energy cost ($)	302,153								
	Total energy (MJ/m^2/year)	483.57								
	Total energy cost efficiency ($/m^2/year)	11.89								
	Total energy cost per person ($/person/year)	333.87								
	Total energy efficiency per person (MJ/person/year)	13,581								
	Comparison fund/Portfolio A average cost efficiency ($/m^2/year)									
	Comparison fund/Portfolio A average consumption efficiency (MJ/m^2/year)									
	Other benchmark									

Greenhouse emissions	NABERS Energy rating (no. stars)	2.5								
	NABERS Energy statistical average for fund/portfolio (no. stars)	0.00								
	Total CO_2 emissions (uncorrected for use) (kg CO_2/year)									
	Total emissions normalised (kg CO_2/m^2)									
	Comparison fund/Portfolio A normalised emissions (kg CO_2/m^2)									
	Comparison fund/Portfolio B normalised emissions (kg CO_2/m^2)									

Water	Average purchase price/kL from utility ($)	0.52								
	Total water consumption (kL)	14,077								
	Total water cost ($)	7,376								
	Total water efficiency (kL/m^2/year)	0.71								
	Total water cost efficiency ($/m^2/year)	0.37								
	Total water utilisation per person (kL/person/year)	15.55								
	Total water cost efficiency per person ($/person/year)	8.15								
	Fund/portfolio average water efficiency (kL/m^2/year)									
	Fund/portfolio average water efficiency per person (kL/person/year)									
	Fund/Portfolio average water cost ($/m^2/year)									
	Comparison fund/Portfolio A average efficiency (kL/m^2/year)									
	Average water consumption (Sydney Water) (kL/m^2/year)	1.13								
	Best practice water consumption (Sydney Water) (kL/m^2/year)	0.50								
	Other benchmark									

Waste Waste collected (W) for landfill (annual)	Total waste collected (kg/year)	127,500								
	Total waste collected (kg/m^2/year)	6.40								
	Waste collected per person (kg/person/year)	140.88								
	Fund/portfolio average (kg/m^2/year)									
	DECC benchmark: Average 7.8 kg/m^2/year	7.8								
	DECC Average 173 kg/person/year	173								
Waste collected for recycling (R)	Total waste recycled (kg/year)	47,491								
	Waste recycled (kg/m^2/year)	2.38								
	Waste recycled per person (kg/person/year)	52.48								
	Fund/portfolio average (kg/m^2/year)									
	Fund/portfolio average per person (kg/person/year)									
	Other benchmark									
Total waste collected & recycled	Total waste collected for recycling and landfill (kg/year)	174,991								
	Total waste collected & recycled (kg/m^2/year)	8.79								
	Total waste collected & recycled (kg/person/year)	193.36								
	Fund/portfolio average total waste collected & recycled (kg/m^2/year)									
	Fund/portfolio average total waste collected & recycled (kg/person/year)									
	Other benchmark									
Recycling ratio	% recycled	37								
	Fund/portfolio average recycling rate (% recycled)									
	Other benchmark									

Transport	Distance to bus stop (m)	100								
	Distance to train station (m)	1,000								
	Distance to train station (km)	1								
	Distance to public carpark (m)	100								
	Number of bicycle spaces provided	32								
	Fund/portfolio average number of bicycle spaces provided	0.00								
	Ratio of bicycle spaces to occupants (%)									
	Fund/portfolio average of bicycle spaces to occupants (%)									
	Green Star goal for bicycle spaces: occupants (%)	5								
	Number of showers provided	3								
	Ratio of showers to bicycle spaces (%)	10								
	Fund/portfolio average of showers to bicycle spaces (%)	0								
	Green Star goal for showers: bicycle spaces (%)	10								

Industry benchmarks	NABERS Water	2								
	NABERS – Fund/portfolio average	3.2								
	Green Star rating if appropriate									

Key

	Calculations made by assessor using data provided by owner
N/A	Data not available (i.e. response made on data sheet, e.g. Not available)
Blank	Data not provided (i.e. blank on data sheet)
Unknown	Data is unknown

Worksheet 3.4C

Monthly property sustainability report

The following information could be reported to building owners on at least a monthly basis for base building reporting.
Format and frequency should be determined by the property owner or fund manager.
This is an example only -- adapt this worksheet to suit your organisation's requirements.

Property performance for the period: _____

Criteria	Scope		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Annual
Occupancy	Total occupation (% of max.)	Target													
		Actual													
		Difference													
Energy efficiency	Electricity consumption (kWh)	Target													
		Actual													
		Difference													
	Gas consumption (MJ)	Target													
		Actual													
		Difference													
	Energy supply costs ($)	Target													
		Actual													
		Difference													
Water & wastewater	Mains water supply (total kL)	Target													
		Actual													
		Difference													
	Total wastewater recycled or reused (kL)	Target													
		Actual													
		Difference													
	Total rain water harvested (kL)	Target													
		Actual													
		Difference													
	Water supply costs ($)	Target													
		Actual													
		Difference													

Criteria	Scope		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Annual
Waste minimisation	Recycled materials (e.g. office paper, co-mingled containers)	Target													
		Actual													
		Difference													
	Wet organic waste (retail) (kg)	Target													
		Actual													
		Difference													
	Residual waste to landfill (kg)	Target													
		Actual													
		Difference													
	Waste removal costs (recycling and residual)	Target													
		Actual													
		Difference													
Refrigerants	Total stored on site (kg)	Target													
		Actual													
		Difference													
	Total ‘lost’ during period (kg)	Target													
		Actual													
		Difference													
Indoor environment and tenant relations (measured by number of tenant complaints)	Thermal comfort (complaints)	Target													
		Actual													
		Difference													
	Noise (complaints)	Target													
		Actual													
		Difference													
	Indoor environment e.g. odours (complaints)	Target													
		Actual													
		Difference													
	Lighting (complaints)	Target													
		Actual													
		Difference													
	Other (complaints)	Target													
		Actual													
		Difference													
	Other (complaints)	Target													
		Actual													

Criteria	Scope		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Annual
		Difference													
	IAQ monitoring costs ($)	Target													
		Actual													
		Difference													
	IAQ monitoring	Target													
	Test Results	Actual													
		Difference													
OH&S[1]	Reported incidents	Target													
		Actual													
		Difference													
	Medical treatment cases	Target													
		Actual													
		Difference													

[1] OH&S performance could be a separate report, but inclusion in a regular sustainability report is recommended.

Worksheet 3.4 D

Annual resource efficiency review

This is an example only – adapt this worksheet to suit your organisation's requirements.

Building/Centre name			
Street address			
Building age			
Size & tenancy		**Building functions**	
Gross floor area	m^2	Office space	m^2
Net lettable area / GLAR	m^2	Retail	m^2
No. of levels (excl. basement)	m^2	Food outlets	m^2
Basement levels	m^2	Carpark	m^2
Average annual vacancy level	%	Other (list)	m^2

	Previous year: 200X		**Current year: 200X**		**Next year**
Resource use	*Target*	*Actual*	*Target*	*Actual*	*Target*
Energy/GHG emissions					
Total electricity (kWh)					
Total gas (MJ)					
Total cost of energy supply ($)					
Total cost of energy supply ($/$m^2$NLA)					
NABERS Energy rating					
Water					
Total water consumption (kL)					
Utilisation (kL/m^2NLA)					
Total wastewater recycled (kL)					
Total cost of water supply ($)					
Total cost of water supply ($/$m^2$NLA)					
NABERS Water rating					
Waste and recycling					
Total solid waste sent to landfill (T)					
Total annual cost of residual waste collection and removal (collection, transport and tip fees) ($)					
Annual residual waste cost efficiency ($/$m^2$NLA)					

	Previous year: 200X		Current year: 200X		Next year
Resource use	*Target*	*Actual*	*Target*	*Actual*	*Target*
Total paper and cardboard waste collected for recycling (T)					
Total other waste collected for recycling (plastics/organics etc.) (T)					
Annual cost of recycling collection ($)					
Annual recycling cost efficiency ($/m^{2}NLA)					
Annual cost of all waste ($)					
Annual waste cost efficiency ($/m2NLA)					
Other waste, i.e. electronic equipment waste (e-waste)					
NABERS Waste rating					
Indoor environment and tenant relations					
Tenant thermal comfort complaints					
Tenant noise complaints					
Tenant indoor environment complaints					
Air quality test results					
Tenant lighting complaints					
Other tenant complaints					
Total costs directly from tenant complaints ($)					
Total cost to rectify tenant complaints ($/m^{2}NLA)					
NABERS Indoor Environment rating					

Sustainability improvements for the period (planned and underway)

Area	Activity	Outcomes sought	Finish date
Greenhouse and energy efficiency	e.g. progress with Energy Management Plan; M&E upgrades, lighting controls, HVAC efficiency upgrades, energy monitoring, risk to NABERS Energy rating, energy advice provided to tenants	Expected benefits in energy savings, GHG reduction, cost savings, NABERS Energy rating	
Water and wastewater	e.g. hydraulic system efficiency upgrades, leakage containment, urinal sensors, usage monitoring, wastewater reuse	Expected benefits in water consumption and cost savings	

Area	Activity	Outcomes sought	Finish date
Waste minimisation	e.g. recycling initiatives, performance monitoring or audits, contamination rate improvements, recycling advice to tenants	Reduced property waste to landfill	
Indoor environment quality	e.g. audit results and recommendations, filtration, noise levels, thermal comfort, tenant complaints or requests	Meet or improve on acceptable levels, reduce or eliminate risks to adverse air quality, support workplace productivity	
Pollution minimisation	e.g. hazardous materials management, refrigerant leakage, trade waste compliance, stormwater run-off, carpark exhaust etc.	Reduce or eliminate pollutants, reduce liability risks	
OH&S	e.g. audit results and recommendations, incident investigations closed, contractor safety training	Reduced scope and severity of OH&S incidents, safer workplace	
Other	e.g. general sustainability assessments or surveys, bicycle parking, showers, tenant surveys, tenant advisory services, supply chain management, procurement contracts etc.	Trend improvements where possible and practical	

Performance analysis

Explain any significant variation from annual targets.	
List impacts of key building services maintenance activities during the year on energy and water efficiency.	
List the impacts of any building upgrade activity during the year on energy and water efficiency.	
Has an Energy, Water, Waste Recycling, or Indoor Environment Management Plan been implemented during the year? If so, describe major activity.	
Have any resource efficiency audits or similar been undertaken during the year? List key outcomes and recommendations.	
List any relevant outcomes of stakeholder partnering activities/projects during the year on resource efficiency (e.g. Greenhouse Challenge, CitySwitch, NABERS Energy Commitment Agreement, Sustainability Covenants etc.)	
Recommendations on next financial year actions required to improve resource efficiency outcomes:	

Person completing the review:	Contact details:
Name	Phone
Position	Mobile
Date of review:	Email

Managing energy

3.5

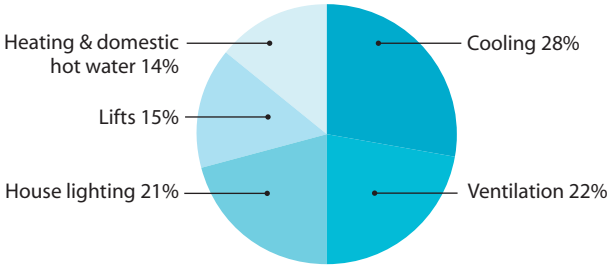
Context

More than 600 Australian office buildings have been assessed for their NABERS Energy rating. This figure demonstrates the increasing attention being focused on energy performance in the office property sector. NABERS Energy and Water ratings are also available for hotels. The retail sector is also achieving savings through energy efficiency and will soon able to benchmark its performance using NABERS in a similar manner to the office sector.

Buildings that have incorporated NABERS into their energy management plans, and have demonstrated this by rating their buildings more than once, have shown an average improvement of 0.5 star, equating to average savings of 10% on greenhouse gas emissions plus the associated energy and its costs. This is a strong incentive to improve your property energy performance and incorporate benchmarking in the process.

Typical energy consumption of commercial properties, base building

Source: www.nabers.com.au



What's in this section

Steps: Managing energy

1 Measure baseline performance

Identify the current energy performance of your building or portfolio. Section 3.4 explains how to do this as part of assessing your property's overall sustainability performance, and Worksheet 3.4A will help you to compile data detailing annual energy usage, including:

- total energy consumption – electricity, gas and other fuels (e.g. diesel) plus comparisons to the previous year
- energy consumption in high energy intensive equipment or activities (e.g. HVAC equipment, lifts) or during peak demand and after-hours use
- details of metering or controls in place to help manage energy (e.g. tenant submeters or lighting controls)
- your NABERS Energy rating.

Worksheet 3.4C is a template for summarising monthly performance data.

It's likely that the process of assessing your energy baseline will reveal gaps in your data, e.g. tenant energy use being included in base building consumption. Barriers to improving and reporting on energy may also become more evident, e.g. metering or the need for equipment upgrades. These discoveries can form the basis of your energy action plan (Step 4 below).

2 Benchmark performance

An important aspect of assessing your baseline performance is benchmarking the building's energy use and greenhouse emissions compared to others in the market, giving you a good indication of relative performance. To benchmark your building, use the NABERS Energy rating system. (NABERS for retail properties will be available later in 2009.)

When your building or portfolio is rated against the benchmarks, you need to ask:

- How does your building or portfolio compare?
- What percentage of your portfolio is below or above average?
- Is this acceptable for the market positioning of your building or portfolio?
- What are the ramifications for obtaining and retaining environmentally aware tenants?
- What are the ramifications for the value of your asset?

Use the benchmarks to set improvement targets and to identify and prioritise properties that may need immediate action. See Section 3.4 for more information about benchmarking using NABERS.

Self assessment

You can self-assess building environmental performance at no cost using the NABERS performance rating calculator (see www.nabers.com.au). The calculator is applicable to base buildings, tenancies and whole buildings.

About NABERS

NABERS is the National Australian Built Environment Rating System managed by the Department of Environment and Climate Change NSW. NABERS is a performance-based rating system which measures the operational environmental impacts of existing buildings.

NABERS office tools can be applied to three distinct situations:

- **Tenancy** ratings that cover the space occupied by a single tenant and under the control of that tenant
- **Base Building** ratings that cover all office spaces for that building, and measure the parameters that are under the control of the landlord or base building
- **Whole Building** ratings that are a combination of both Tenancy and Base Building for the situation where a tenant is the owner and/or has control of all services.

For more information see www.nabers.com.au

Self-assessment can give you a rough idea of performance, but you need to be careful that the information you enter is as accurate as possible and conforms to the data needed by the calculators.

For example, if you're using the base building energy calculator, the area should be based on the net lettable area (NLA) minus spaces that can be excluded (e.g. retail areas in an office building) and the energy usage data needs to relate only to the part of the building being rated, e.g. the base building. If the information you enter is not accurate (e.g. using the number of computers on the asset register instead of the number of frequently used computers) the results can be misleading. If you are uncertain about self-assessment look for further information on the NABERS website or seek advice from a NABERS Accredited Assessor.

Accredited assessment

To ensure the accuracy of the results you obtain, and to use the rating to promote your property or organisation, or to use the NABERS trademarks, you must obtain a certified rating from a NABERS Accredited Assessor. Make sure you use an assessor with good knowledge of energy efficiency and sustainability practices in both commercial property design and management. A list of assessors is available at www.nabers.com.au. An Accredited Assessor can also give you general advice or help you with an unofficial self-assessment.

3 Set performance targets

Now that you have established your baseline performance, set firm improvement targets with milestones for action. Energy targets should relate to your organisation's sustainability goals and should be practical and achievable at a stretch. You may wish to articulate your energy commitments and targets in your organisation's sustainability policy (See Section 2.3: 'Developing a sustainability policy for your organisation'.)

When setting targets ask the following questions:

- How do your targets compare with your peers in the market?
- Have you informed your internal and external stakeholders of the targets? Do the targets meet the stakeholders' current and future expectations?
- Can you verify progress in relation to the targets?

Allocate responsibility for achieving the targets. Where applicable, integrate the targets and minimum standards into service or performance contracts with relevant service providers and staff performance agreements.

Energy hungry empty buildings

'Analysis of smart metering data from 39 Martin Place Sydney confirmed that HVAC operating hours during weekdays and weekends did not necessarily match occupancy times. Energy consumption for the periods before occupancy on weekdays and weekends was excessive.

The building managers worked out they could reduce operational energy consumption by adjusting operating schedules and control strategies. The most noticeable change was reducing overnight base load from 400 kW to 75 kW. There were further opportunities too, e.g. revising control strategies to reduce energy consumption during after-hours and weekend operations. The operating load during start-up changed from 437 kW to 261 kW.

Estimated annual savings calculated from the smart metering data:

- Total savings: $9,660
- Total reduction in usage: 120,750 kWh
- Total reduction in emissions: 113,505 kg/$Co_{2\text{-}e}$'

Colonial First State Global Asset Management

Energy target examples

Example base building energy performance targets include:

- increasing the building's NABERS Energy rating by 1 star within a 12-month timeframe (be sure to set a specific date)
- reducing the building's energy intensity (kWh/m^2) by 25% within 18 months
- having metering installed for all energy intensive activities within 6 months.

Portfolio targets might include:

- achieving an average 4.5-star NABERS Energy rating across the portfolio by a specific date
- reducing portfolio energy use by 15% by a specific date
- purchasing XX% of electricity from accredited GreenPower sources across the entire portfolio.

Make sure your targets are not numbers hidden in a report. Make them part of 'business as usual' operations. Promote targets to key stakeholders and ensure they understand the process you have committed to and the intended benefits.

4 Develop an energy action plan

Develop an action plan to improve energy performance and achieve your targets. The plan should identify responsibilities and timeframes for action. You could use Worksheet 3.5A as a guide. Work out what measures need to be undertaken, and when. Assess each action against the business case to determine if the initiatives are:

- short-term opportunities, i.e. actions having a short payback period (typically less than 3 years) or yielding significant energy savings
- medium-term opportunities, i.e. actions having a payback period of 3 to 5 years, most likely involving changes in building maintenance and operation procedures such as cleaners turning off lights or changing building management system settings, or
- long-term opportunities, i.e. actions having a payback period of 5 years or more, involving capital upgrades and retrofits and therefore requiring budget allocations over a number of years.

Also identify whether the actions will require collaboration with tenants, such as refurbishment activities and fitouts.

Identify energy improvement initiatives

Once you have identified areas of poor performance, some easy wins will be readily actionable, and should be included in either maintenance programs, reviews of operational procedures or future upgrade or refurbishment projects. Others may simply require a behavioural change by staff, such as turning off lights in areas not being used. Some common energy efficiency measures are listed below.

You could use the energy checklist provided in Worksheet 3.5B to start identifying improvement steps. This checklist is structured around base building equipment and management processes that are major energy consumers:

- lighting
- heating, ventilation and air conditioning
- domestic hot water
- metering, tariffs and billing.

The checklist should be read and used in conjunction with AS 3598:2000 *Energy Audits*, including the data recording templates and audit procedures provided in this Standard.

Smart thermostat trial

'People tend to dress for the seasons and the weather. However, air conditioning within office buildings is typically set to provide a 21.5 + 1°C temperature range, regardless of outdoor conditions. This is not only a waste of energy, but reduces relative comfort for building occupants.

Over the 2006/07 summer period, Investa collaborated with CSIRO and Sustainability Victoria to study how temperature variance could be managed better to improve tenant comfort and save energy.

Experiments were performed in one of Investa's commercial buildings in Melbourne. CSIRO implemented new software for the air conditioning control system that, depending on the outside temperature, made slight changes to the thermostat setting. The effects of these changes on the electricity consumption were calculated through data analysis from power meters fitted to the HVAC system.

The results of the experiments showed that it is feasible to reduce electricity consumption by up to 15% on a hot summer's day through intelligent control of the building's thermostats.

The power savings recorded on the trial were much better than the initial modelling predicted. Plans are now underway to implement these strategies across Investa's commercial property portfolio, multiplying the value of this trial.'

Investa Property Group, www.investa.com.au

Key actions might include undertaking energy audits and detailed technical reviews. See *Your Building* for further information on energy opportunities: www.yourbuilding.org/display/yb/Home

Although a performance review involving target setting could be an annual event, it may be desirable to undertake energy audits at least every 5 years, or when major unplanned changes in energy performance occur. Audits at this frequency should be to at least a Level 2 scope as set out in AS 3598:2000 *Energy Audits*. The report from a Level 2 audit often forms the justification for substantial investment or an energy performance contract, so detailed economic analysis with an appropriate level of accuracy is required.

5 Collect data and monitor performance

Review existing energy monitoring and data management capabilities, including the building management and control system. What improvements are required so that accurate data can be collected and reported at least monthly? When designing your monitoring system make sure key tenants or energy intensive areas can be submetered (e.g. retail, food courts, fitness centres, carparks and HVAC equipment). Make sure the data collected:

- represents the total energy used (including electricity, gas and fuel e.g. diesel)
- can be used for external benchmarking – check with the NABERS website or your Accredited Assessor to make sure the data you collect is useful for evaluating and achieving your NABERS targets.

Check that key service providers are able to collect data in the format and at the frequency you require. Do not rely solely on utility company invoices or statements. Check against trend performance and be conscious of which meters are being used to account for usage. Undertake a simple verification check on your energy data to ensure its accuracy and comprehensiveness.

6 Update building maintenance and operational procedures

Review building maintenance and operational procedures to make sure that energy savings measures are part of everyday activities. For example, check that:

- poor maintenance of energy intensive equipment is not causing energy wastage
- standard building operating procedures are not causing lights or equipment to be left on unnecessarily

Energy audits and detailed technical reviews

It's good practice to undertake energy audits to provide a detailed analysis of energy usage, the savings that can be made and the cost of achieving those savings. An audit may cover a whole building or may concentrate on an individual item or process, e.g. HVAC equipment.

AS 3598:2000 *Energy Audits* includes information that will help you identify the appropriate audit scope for your situation, e.g. will you be best served by a desktop assessment or a detailed analysis with a high level of accuracy and including cost estimates? AS 3598:2000 *Energy Audits* lists the benefits of energy auditing and provides guidance on the auditing process, as well as outlining a typical energy management program.

Detailed technical information can be sourced from building services designers and manufacturers and through industry associations such as the Australian Institute of Refrigeration Air Conditioning and Heating (AIRAH).

AIRAH has a peer-based assessment procedure for energy auditors who are competent in preparing Level 3 standard energy audits. To access a register of these auditors go to www.airah.org.au/ene_aud.asp.

The Greenhouse Challenge Plus program also has a helpful range of energy audit tools, see www.environment.gov.au/settlements/challenge/members/energyaudittools.html

- sensors are calibrated so systems are working as designed
- control loops are fine-tuned for seasonal variations.

Pay careful attention to the mid seasons, when it's most likely that both cooling and heating will occur. Make sure temperature set points are suitable for efficient operation.

7 Integrate energy management into contracts

Review energy contracts to identify rewards for energy conservation initiatives, e.g. energy performance contracting. Build energy management requirements in to other contracts such as controls contracts and those for subcontractors working on site. Make energy efficiency a key performance indicator for maintenance and controls contractors.

8 Report performance monthly

Include energy management in regular base building reporting. Ensure monthly reporting tracks performance against targets, and investigate variations or unusual events. Include performance monitoring results in your monthly property sustainability report. Use Worksheet 3.4C as a guide or adapt it and integrate it into your existing monthly reports.

At team meetings discuss monthly performance and the measures taken to maintain or adjust building services so they make the best contribution to meeting your energy targets.

9 Engage tenants

Regularly engage with your tenants to support them in reducing their energy use and keep them-up-to date on the performance improvements you are working on. Make them a part of the process and let them know how you are improving their building.

Encourage tenant's staff and key contractors to reduce energy too, by turning off lights when not required, purchasing energy efficient equipment, appliances and services, and appropriately maintaining any HVAC equipment they own.

Check that tenant HVAC systems are energy efficient and integrated with the base building operations. Make sure tenants' HVAC equipment is not fighting against your base building HVAC.

Easy wins

Some common 'easy win' energy efficiency initiatives include the following:

- Increase the energy efficiency of lighting systems, including controls and lamps, and improve user access to zoned lighting controls both during and after common working hours.
- Consider removing lamps ('de-lamping') where applicable.
- Consider the opportunities from power factor correction.
- Review winter and summer set points for your air conditioning.
- Increase control of lighting in areas only occasionally occupied by installing motion detectors or similar devices.
- Educate staff so they understand the merits of switching off equipment that is not being used.
- Review, and where feasible, reschedule the operational hours of building HVAC, in particular the system's evening shut-down or early morning starts.
- Replace inefficient HVAC motors and equipment when they're at the end of their useful lives.
- Review the feasibility of using variable speed drives on existing motors.

(Continued next page)

Encourage tenants to:

- turn computers off when not in use
- turn lights off when not in use
- fine tune after-hours lighting – talk to tenants about their hours of operation so you can make sure your building management system is turning lights on only in areas that need it
- use fire stairs in lieu of lifts when moving between floors
- purchase energy saving equipment
- look for any savings that could be made with heating and cooling – see the smart thermostat case study
- implement energy saving measures in their fitout
- participate in recognition programs e.g. CitySwitch Green Office (previously the 3CBDs Greenhouse Initiative); see www.cityswitch.net.au
- make sure their fitouts don't interfere with base building HVAC operation.

For more information about helping tenants to reduce their energy use, see the *Tenant Energy Management Handbook* (download it from www.nabers.com.au). See also Sections 3.3: 'Tenant engagement and green leases' and 4.3: 'Sustainable fitouts' for more information about working with tenants on reducing energy consumption.

10 Review performance annually

Review your energy consumption trends.

- How have you progressed against your targets?
- What can you do over the next 12 months to improve performance?

Include energy in your annual resource efficiency performance review. Section 3.4 and Worksheet 3.4D provide more detail and a template for this.

Public reporting of your performance is the key to ensuring accountability and a positive corporate reputation amongst your stakeholders. Your annual review and report should include official, accredited NABERS ratings. This gives stakeholders confidence that the reported standards are reliable, and that you are committed to achieving the targets you have established.

Update your energy action plan once you have completed your annual review.

Easy wins (continued)

- Install submetering and 'smart metering' technologies that will let you quickly and easily detect changes in operations or excessive use.
- Review and improve building management and control systems of HVAC, water services and lighting operational cycles.
- Make sure that inefficient water management is not generating unnecessary water heating.
- Set performance standards in energy contracts to ensure more accurate information is available to building management, and energy efficiency and peak demand reduction are considered.
- Undertake energy audits to identify measures to be included in management plans which focus on incremental improvement and regular monitoring, as well as larger one-off capital improvements.
- Look at alternative energy sources and renewable options such as accredited GreenPower.

Surprise results

Being intensely involved in managing a building can make it difficult for you to be objective. For example, a building that has excellent management practices can suggest to its managers that there is nothing more to do, but a poor result in benchmarking can lead to further investigation and show that systems need to be upgraded, or are being used in ways that were not intended in the building or services design. This exact scenario has unearthed some buried opportunities, with some buildings improving their performance to beyond what they thought was achievable.

Further information

- Australian Institute of Refrigeration Air Conditioning and Heating (AIRAH) has a number of technical papers, including AIRAH DA19 'HVAC&R maintenance', industry best practice measures and schedules for the whole range of HVAC&R plant and equipment, www.airah.org.au
- Australian Building Codes Board, www.abcb.com.au
- NSW Green Business Program for funding opportunities, www.environment.nsw.gov.au/grants/ccfgbp.htm
- *ESD Design Guide for Office and Public Buildings*, Edition 3, Department of the Environment, Water, Heritage and the Arts, May 2007, www.environment.gov.au/settlements/publications/government/esd-design/index.html
- Accredited GreenPower, www.greenpower.gov.au
- NABERS, www.nabers.com.au
- Green Star Tools, www.gbca.org.au
- Property Council of Australia Energy Guidelines 2001, section 4, 'Setting Energy Targets'
- SEAV Building Energy Brief for Commercial and Public Buildings, 2003, www.energy-toolbox.vic.gov.au/dmdocuments/building_guidelines/Building_energy_brief_v1.3b.pdf
- *Tenant Energy Management Handbook*, www.nabers.com.au
- The Engineering Sustainable Solutions Program Sustainable Energy Solutions Portfolio, www.naturaledgeproject.net/Sustainable_Energy_Solutions_Portfolio.aspx
- Greenhouse Challenge Plus Energy Audit tools, www.environment.gov.au/settlements/challenge/members/energyaudittools.html

Carpark working overtime

'Analysis of smart metering data collected at 1 York Street Sydney over a 6-month period found that the energy consumption for the carpark supply and exhaust fan was a constant load with no noticeable reduction for weekends and after hours.

The metering contractors notified the building engineer through the monthly report, who then asked the building management systems (BMS) contractor to investigate further. The BMS technician found that the settings on the carpark ventilation controller were incorrect. By reprogramming the correct settings into the controllers the fans now operate only on demand or when carbon monoxide levels are high.

Estimated annual savings calculated from the smart metering data:

- Total savings: $9,500
- Total reduction in usage: 119,212 kWh
- Total reduction in emissions: 112,212 kg/$Co_{2\text{-}e}$'

Colonial First State Global Asset Management

Worksheets

Review and use these Word documents:

3.5A Energy action plan

3.5B Energy checklist – base building

Worksheet 3.5A

Energy action plan

This is an example only – adapt this worksheet to suit your organisation's requirements, and review your plan on an annual basis.

Property name:		
Address:		
NLA or GLA of building (m^2):		
Date:	Prepared by:	Approved by:
Key contractors for the following services:		
HVAC:	Controls:	
Electrical:	Cooling towers:	
Lighting:	Lifts:	
Metering:	Other:	

Energy efficiency targets for financial year: *insert your targets*

	Base building energy		**Whole building energy**	
	Previous year actual	**Annual target**	**Previous year actual**	**Annual target**
Total electricity (kWh)				
Total gas (MJ)				
Total other fuels (L)				
Total energy (MJ/m^2) [1]				
Total cost of energy supply ($)				
Total cost of energy supply ($/m^2$)				
Total CO_2 emissions (tonnes) [2]				
NABERS Energy rating				
Other:				

[1] To convert kWh to megajules (MJ) multiply by 3.6

[2] To convert kWh to kg of CO_2 see the National Greenhouse Accounts (NGA) Factors for the latest greenhouse emission factors, Australian Government Department of Climate Change, www.greenhouse.gov.au/workbook/index.html

Short-term opportunities

(Actions with a payback of typically less than 3 years)

	Actions or initiatives to be taken to achieve targets or reduce energy consumption	**Responsibility**	**Expected energy savings** (kWh or MJ)	**Cost to implement**	**Payback period or internal rate of return**	**Time required to implement**	**Planned completion date**	**Actual completion date**
	HVAC ventilation							
	HVAC cooling/heating							
	HVAC pumping							
	HVAC controls							
	Lighting equipment							
	Lighting controls: dimming, switching and time control systems							

	Actions or initiatives to be taken to achieve targets or reduce energy consumption	**Responsibility**	**Expected energy savings** (kWh or MJ)	**Cost to implement**	**Payback period or internal rate of return**	**Time required to implement**	**Planned completion date**	**Actual completion date**
	Domestic hot water							
	Lifts							
	Miscellaneous							

Summary for short-term opportunities

Total energy savings (kWh or MJ):
Total energy savings as a % of total use
Total cost savings ($)
Total cost savings as a % of total cost

Sign:	Sign:
Date:	Date:

Medium-term opportunities

(Actions with a payback of typically between 3 to 5 years, often with other benefits too.)

	Actions or initiatives to be taken to achieve targets or reduce energy consumption	**Responsibility**	**Expected energy savings** (kWh or MJ)	**Cost to implement**	**Payback period or internal rate of return**	**Time required to implement**	**Planned completion date**	**Actual completion date**
	HVAC ventilation							
	HVAC cooling/heating							
	HVAC pumping							
	HVAC controls							
	Lighting equipment							
	Lighting controls: dimming, switching and time control systems							
	Domestic hot water							

	Actions or initiatives to be taken to achieve targets or reduce energy consumption	**Responsibility**	**Expected energy savings** (kWh or MJ)	**Cost to implement**	**Payback period or internal rate of return**	**Time required to implement**	**Planned completion date**	**Actual completion date**
	Lifts							
	Miscellaneous							

Summary for medium-term opportunities

Total energy savings (kWh or MJ):
Total energy savings as a % of total use
Total cost savings ($)
Total cost savings as a % of total cost

Sign:	Sign:
Date:	Date:

Long-term opportunities

(Actions with a payback of typically more than 5 years, but with other significant benefits such as improved maintenance and conditions.)

	Actions or initiatives to be taken to achieve targets or reduce energy consumption	**Responsibility**	**Expected energy savings** (kWh or MJ)	**Cost to implement**	**Payback period or internal rate of return**	**Time required to implement**	**Planned completion date**	**Actual completion date**
	HVAC ventilation							
	HVAC cooling/heating							
	HVAC pumping							
	HVAC controls							
	Lighting equipment							
	Lighting controls: dimming, switching and time control systems							
	Domestic hot water							

	Actions or initiatives to be taken to achieve targets or reduce energy consumption	**Responsibility**	**Expected energy savings** (kWh or MJ)	**Cost to implement**	**Payback period or internal rate of return**	**Time required to implement**	**Planned completion date**	**Actual completion date**
	Lifts							
	Miscellaneous							

Summary for long-term opportunities

Total energy savings (kWh or MJ):
Total energy savings as a % of total use
Total cost savings ($)
Total cost savings as a % of total cost

Sign:	Sign:
Date:	Date:

Worksheet 3.5B

Energy checklist – base building

This checklist should be read in conjunction with AS 3598:2000 *Energy Audits*. It sets out issues to be investigated as part of a comprehensive energy audit for an existing commercial building. This is an example only – adapt this worksheet to suit your organisation's requirements, e.g. delete items not applicable to the audit type or scope, or property being audited.

Item check	Yes, No or N/A	Recommended actions
Lighting		
Calculate the installed lighting power densities and compare to Green Star best practice. Consider using Green Star Office Existing Building Energy Calculator and Lighting Calculator to identify performance, including a preliminary NABERS rating and office lighting power density. See www.gbca.org.au/green-star/rating-tools/		
Based on the above analysis, are there areas where lighting power density can be reduced?		
Are switched lighting zones appropriate to floor occupation patterns? Is there an opportunity to adjust zones to reduce energy consumption?		
Do occupants understand and use the controls for switching circuits? Can on-floor location or labelling of controls be improved?		
Are power reduction devices installed to reduce power to fluorescent lighting once turned on?		
Are triphosphor lamps installed or can they be installed? Can 'de-lamping' be implemented?		
Are diffusers needed? Are existing diffusers efficient? Are diffusers and fittings clean?		
Are surface finishes light in colour to reflect light?		
Can incandescent lamps be replaced with compact fluorescent lamps or similar? (high efficiency, low wattage)		
Are lights left on in unoccupied areas for more than 30 minutes?		
How and when are lights switched on and off each day? Are automatic lighting controls installed and how well to they relate to hours of occupation?		
Are after-hours lighting control schedules adequate to avoid unnecessary energy use?		
Is there reduced perimeter lighting capability?		
Are light levels (lux) suitable for the tasks and can they be reduced?		
Can automatic controls be permanently overridden by mistake?		

Item check	Yes, No or N/A	Recommended actions
High density discharge lighting – is it the most efficient possible? (e.g. can low pressure sodium be used?)		
Check need for controls in specific areas using occupancy detectors, clockwork (e.g. switches where user dials up time required) or time delay switches in rooms not in constant use.		
Are there low voltage halogen lights, and can these be replaced by more efficient lamps?		
Are there decorative lights, and can these use more efficient lamps or be switched off during normal operation?		
Other:		
Other:		
Heating, ventilation and air conditioning (HVAC)		
Are any peak energy demand reduction measures in place? (distributed energy systems, cogeneration etc). If so, to what % capacity?		
Is fresh air supply adequate for demand?		
Check that on/off programming is appropriate to building use.		
Are after hours and holidays programmed correctly?		
For after-hours use, does HVAC operate only for the spaces required?		
Does cooling or heating occur while building is generally unoccupied?		
Can automatic controls be manually or permanently overridden?		
Are there any heaters that are not thermostatically controlled?		
Are personal radiators or fans used anywhere?		
Are northern or western facades separately controlled?		
Are HVAC components appropriately sized?		
Could higher efficiency motors be used?		
Is a low load chiller present for after-hours use?		
Should room air conditioners or split systems be installed in small areas with frequent after-hours use to avoid the need to turn on the full system?		
How old is the HVAC plant? What is its expected economic life?		
Is it a cost effective HVAC solution for this application, considering whole of life costs?		
Is the control system able to be operated by building engineers and capable of achieving reasonable economy?		

Item check	Yes, No or N/A	Recommended actions
Are thermostats located away from heating and cooling devices or external facades?		
Are temperature set points appropriate? Do occupants generally report they are comfortable all year around? Should the range of acceptable temperatures be expanded?		
Is there floor zoning with accessible controls accessible to users?		
Can automatic doors, air curtains or weather screens in front of doors be used to reduce heat loads or losses in foyers?		
Can heat loss or gain be reduced by insulating ducts, pipes, walls or floor spaces; painting outside surfaces with light colours; tinting windows or closing drapes at certain times; or installing building shading devices (inc. trees)?		
Could external shading be improved?		
Are outside doors fitted with automatic door closers?		
Would ventilation of equipment rooms and roof spaces be cost effective?		
Are high efficiency filters used and replaced regularly?		
Are outdoor air volumes increased or reduced appropriately?		
Are outside air levels appropriately matched to the need for outside air at different times?		
Can carbon dioxide sensing or other methods be used to alter the amount of fresh air intake?		
Are processes that contaminate the air isolated so that air changes for other areas are not excessive?		
Is there excessive heat build-up in air plenums due to machinery or solar heat loads?		
Is an economy cycle present or appropriate?		
Can evaporative cooling be used, either as the only source of cooling or to pre-cool outside air for a refrigeration system?		
Is there any reheating of air carried out that could be further developed or avoided?		
Are humidity controls present that can be avoided, relaxed or accomplished more efficiently?		
Is there a time delay on after-hours air conditioning controls? What is the time delay period? Can it be shortened?		
Can the after-hours conditioning button be used to manually turn equipment off?		
Are users aware of this feature? Can labelling be improved?		

Item check	Yes, No or N/A	Recommended actions
Have you considered hybrid cooling tower alternatives that provide lower energy or water conservation options?		
Is all equipment accessible for maintenance?		
Have you considered recommissioning your HVAC and controls system?		
Do you understand how your building automation system operates and how to get the best energy performance from it?		
Have you considered trimming pump impellors?		
Are there opportunities for variable speed drives and variable expansion valves?		
Have you considered using variable speed drives for fans pumps where applicable?		
Can access to after-hours air conditioning be controlled by building managers, and users charged directly for after-hours air conditioning use?		
Are there opportunities for heat recovery (e.g. run-around coils)?		
When were air conditioners last maintained? How often are they maintained? Can maintenance procedures be improved?		
Are dampers well maintained and operating correctly?		
Are filters, fins and heat exchange coils cleaned?		
Are valves checked for leakage?		
Is any air leaking from ducts, doors or windows?		
Check duct insulation by checking for a rise or drop in temperature by measuring temperature at the beginning and end of pipe runs. (A significant temperature change means that insulation needs upgrading, especially if pipes are exposed to the outdoors or enclosed in a hot roof space.)		
Perform an operational and staging check on chillers and boilers. (Analyse equipment that measures all significant operating parameters and calculate a chillers actual coefficient of performance.)		
Are fan static pressures too high? Can duct resistance be reduced by reducing or removing sharp bends or modifying acoustic silencers?		
Check thermostat calibration and that sensors and controllers are operating correctly. Are moving parts properly lubricated?		
Can you implement or optimise existing stop/start or other ‘start up later/switch off earlier’ operating time strategies?		
Is any form of flushing/night purge used?		

Item check	Yes, No or N/A	Recommended actions
Can heaters or chillers be switched off earlier because the building's thermal inertia maintains conditions for some time?		
For leased buildings, check that metering of after-hours air conditioning use and calculation of bills for after-hours air conditioning use is according to actual energy use + 10%.		
For leased buildings, should a kilowatt hour meter be installed to log after-hours air conditioning use instead of an hours-run meter?		
For leased buildings, check that programmed air conditioning start and stop times are not outside the hours of operation being paid for by the building owner.		
Metering, tariffs and billing issues		
Is submetering provided to all high-energy uses in the building? Describe.		
Are tenancies submetered?		
Is carpark energy use metered separately?		
Is load shifting, shedding or power factor correction feasible to reduce energy costs?		
Should a tariff shift be adopted?		
For leased buildings, check which circuits are on which billing meters (to avoid paying for someone else's energy).		
Domestic hot water		
Are all hot water heaters needed? Are any over-sized?		
What hours do hot water heaters run? What hours do they need to run? Can time switching be justified?		
Are existing hot water units efficient? What are their likely economic lives? What should they be replaced with when they reach the end of their lives? Should they be located closer to usage points?		
Are showerheads 3-star and taps 4-star WELS-rated or greater?		
Are flow-restricting valves used on hot water taps?		
Is there any leakage of hot water? (e.g. taps, pipes or valves)		
Do circulating pumps operate when the building is unoccupied? Are they necessary at all times during occupation?		
Is the water temperature unnecessarily above 60-65 degrees?		
Are pipes insulated (min. 10 mm) between hot water heater and taps?		
Should the hot water tank be insulated or more insulated?		

Item check	Yes, No or N/A	Recommended actions
Is heat reclamation from other equipment on site a possible source of water heating?		
Other		
Are lifts programmed to minimise excess travel?		
Are lift motors high efficiency?		

Managing water

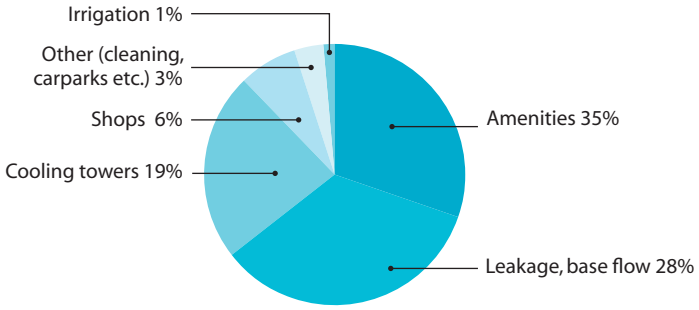
3.6

Context

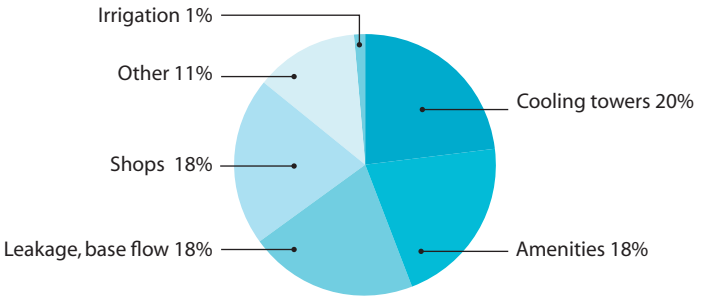
Long-term uncertainty about water supply and prolonged drought has focused our attention on the urgent need to treat water as a scarce resource. Commercial buildings in greater Sydney alone use nearly 75 million litres of water every day (Sydney Water 2007). Couple this with rising water prices, and we have an unquestionable reason why offices and retail centres need to effectively manage their water consumption.

In NSW, a NABERS Water rating improvement of just 1 star equates to water savings of approximately 25%. This should be an achievable goal for your organisation and will demonstrate your environmental credentials as well as save you money.

Typical water consumption of commercial office buildings, including leaks



Typical water consumption of retail centres, including leaks



Source: *Best practice guidelines for water conservation in commercial office buildings and shopping centres*, Sydney Water 2007.

What's in this section

Same as the early 1970s

Community involvement in saving water has been a real success story in Sydney, with the same amount of water being used today as in the early 1970s despite population growth of over 1 million people since then. This success makes it all the more important that the commercial property sector is not seen as wasteful when people have made significant cut backs at home.

Steps: Managing water

1 Measure baseline performance

Identify the current water performance of your building or portfolio. Section 3.4 explains how to do this as part of assessing your property's overall sustainability performance, and Worksheet 3.4A will help you to compile information detailing annual water usage, including:

- total water consumption, plus comparisons to the previous year
- details of metering in place, particularly for areas of high water usage e.g. cooling towers, food courts
- information about whether leaks are a major issue
- information about whether any existing water saving devices have been installed such as dual flush toilets or flow restrictors in taps
- monthly performance data
- your NABERS Water rating.

Worksheet 3.4C is a template for summarising monthly performance data.

It's likely that the process of assessing your water baseline will reveal gaps in your data, e.g. you may have only one water bill for the whole building, with no submetering. The process will also reveal whether any opportunities to supplement your water supply have been investigated e.g. through rainwater harvesting. These discoveries can form the basis of your water action plan (Step 4 below).

2 Benchmark performance

An important aspect of assessing your baseline performance is benchmarking the building's water performance compared to others in the market. Benchmarking your water use may help you identify whether leaks are a problem or if you are using much more water than other similar buildings. To benchmark your building, use the NABERS Water rating system or compare your building to the Sydney Water data.

When your building or portfolio is rated against the benchmarks, you need to ask:

- How does your building or portfolio compare?
- What percentage of your portfolio is below or above average?
- Is this acceptable for the market positioning of your building or portfolio?

Sydney WATER

Water management best practice

An invaluable reference for building managers is *Best practice guidelines for water conservation in commercial office buildings and shopping centres*, published by Sydney Water in 2007. The guidelines:

- set benchmarks for water use in commercial buildings and shopping centres
- explain how to implement water conservation projects
- provide advice on alternative water sources
- contain a practical water saving checklist to identify water saving opportunities. (included in this guide as Worksheet 3.6B).

The guidelines were prepared as part of Sydney Water's Every Drop Counts Business Program for which Sydney Water was awarded the Stockholm Industry Water Award 2006, a Banksia Award for Eco Innovation 2006, and a Department of Environment and Climate Change NSW Sustainability Green Globe Award – Government category – 2008. The best practice guidelines also made Sydney Water a finalist in the 2008 Banksia Awards – Education category.

Find out more about the Every Drop Counts Business Program at www.sydneywater.com.au/SavingWater/InYourBusiness/EDCBusinessProgram.cfm

every drop counts

- What are the ramifications for obtaining and retaining environmentally aware tenants?
- What are the ramifications for the value of your asset?

Use the benchmarks to set improvement targets and to identify and prioritise properties that may need immediate action. See Section 3.4 for more information about benchmarking using NABERS, and also see Sydney Water's *Best practice guidelines for water conservation in commercial office buildings and shopping centres*, available online at www.sydneywater.com.au/SavingWater/InYourBusiness/

Self assessment

You can self-assess building water use at no cost using the NABERS performance rating calculator. See www.nabers.com.au. This calculator is applicable to whole buildings only.

Self-assessment can give you a rough idea of performance, but you need to be careful that the information you enter is as accurate as possible and conforms to the data needed by the calculators.

If you are uncertain about self-assessment look for further information on the NABERS website or seek advice from a NABERS Accredited Assessor.

Accredited assessment

To ensure the accuracy of the results you obtain, and to use the rating to promote your property or organisation, or to use the NABERS trademarks, you must obtain a certified rating from a NABERS Accredited Assessor. Make sure you use an assessor with good knowledge of sustainability practices in both commercial property design and management. A list of assessors is available at www.nabers.com.au. An Accredited Assessor can also give you general advice or help you with an unofficial self-assessment.

3 Set performance targets

Set firm targets for reducing water consumption with milestones for action. Sydney Water suggests organisations that conduct a water audit can identify annual savings targets of 20% or more.

Water targets should relate to your organisation's sustainability goals and should be practical and achievable at a stretch. You may wish to articulate your water commitments and targets in a dedicated water management policy or as part of your overall sustainability policy (See Section 2.3: 'Developing a sustainability policy for your organisation'.)

NABERS

About NABERS

NABERS is the National Australian Built Environment Rating System managed by the Department of Environment and Climate Change NSW. NABERS is a performance-based rating system which measures the operational environmental impacts of existing buildings.

NABERS office tools can be applied to three distinct situations:

- **Tenancy** ratings that cover the space occupied by a single tenant and under the control of that tenant
- **Base Building** ratings that cover all office spaces for that building, and measure the parameters that are under the control of the landlord or base building
- **Whole Building** ratings that are a combination of both Tenancy and Base Building for the situation where a tenant is the owner and/or has control of all services.

For more information see www.nabers.com.au

Water target examples

Example base building water performance targets include:

- increasing the building's NABERS Water rating by 1 star within a 12- month timeframe (be sure to set a specific date)
- reducing the building's water intensity (kL/m^2 or kL/patron) by 30% within 18 months
- installing metering for all water intensive activities within 6 months
- implementing water harvesting measures to reduce mains supply water use within 12 months.

Portfolio targets might include:

- achieving an average 4.5-star NABERS Water rating across the portfolio by a specific date
- reducing water consumption by 30% by a specific date.

When setting targets ask the following questions:

- How do your targets compare with your peers in the market?
- Have you informed your internal and external stakeholders of the targets? Do the targets meet the stakeholders' current and future expectations?
- Can you verify progress in relation to the targets?

Integrate the targets and minimum standards into service or performance contracts with relevant service providers, particularly for cooling tower services and landscaping. Integrate the targets into staff performance where appropriate and make someone responsible for achieving them.

Make sure your targets are not numbers hidden in a report. Make them part of 'business as usual' operations. Promote targets to key stakeholders and ensure they understand the process you have committed to and the intended benefits.

4 Develop a water action plan

Develop an action plan to improve performance and achieve your water savings targets. The plan should identify responsibilities and timeframes for action. You could use Worksheet 3.6A as a guide. Work out what measures need to be undertaken, and when. Assess each action against the business case to determine if the initiatives are:

- short-term opportunities, i.e. actions having a short payback period (typically less than 3 years) or yielding significant water savings. These may often involve changes in building maintenance and operation procedures, such as cleaners reducing water used during cleaning operations or outdoor maintenance staff sweeping rather than hosing down hard surfaces – but don't trade the hose for a carbon intensive leaf blower!
- medium-term opportunities, i.e. actions having a payback period of 3 to 5 years, and may depend on contract renewal timeframes, or
- long-term opportunities, i.e. actions having a payback period of 5 years or more, involving capital upgrades and retrofits and therefore requiring budget allocations over a number of years.

Also identify whether the actions will require collaboration with tenants, such as refurbishment activities and fitouts.

Every Drop Counts

'Sydney Water's Every Drop Counts Business Program helps organisations to implement water savings measures. As of September 2008, four property owners have been leaders and reached 5-stars under the 'One–2–Five' water mangagement diagnostic process. This rating represents best practice and continuous improvement in water management.

The Every Drop Counts Business Program can help you with conducting water audits. Typical recommendations arising from an audit include:

- setting up systems for regular monitoring of water meters
- increasing frequency of preventive maintenance programs to detect early leaks
- reducing flow rates in showers
- reducing size of toilet cisterns to dual flush or 6 litres per flush
- reducing flow rates in taps
- downsizing main meters
- adjusting urinal flush sensors
- increase cooling tower water concentration cycles
- converting to waterless urinals where possible.'

Sydney Water Every Drop Counts Business Program

Going waterless

'The Direct Property Investment Fund (one of the unlisted property funds within Colonial First State Global Asset Management) undertook a pilot project at 39 Martin Place Sydney using a water soluble block placed in urinals. The product reduces the need for regular flushing and has no detrimental impact on sewer outflow or the plumbing system. The 12-month trial achieved:

- total water supply savings of $12,450 or 37% of annual costs
- total reduction of 14.8 megalitres

with a 7-month investment payback.'

Colonial First State Global Asset Management, www.cfsgam.com.au

Identify water conservation initiatives

Once you have identified areas of poor performance, some easy wins will be readily actionable, and should be included in either maintenance programs or future upgrade or refurbishment projects. Some common water conservation measures are listed below.

You could use Sydney Water's water saving checklist provided in Worksheet 3.6B to start identifying improvement steps. The checklist is structured around base building equipment and management processes that are major water consumers:

- amenities
- cooling tower operations and cooling systems
- kitchens and food courts
- fitness centres
- outdoor areas
- cleaning activities.

Key actions might include undertaking detailed technical reviews and water audits. Sydney Water's Every Drop Counts program may be able to help you, see www.sydneywater.com.au/SavingWater/InYourBusiness/EDCBusinessProgram.cfm

See *Your Building* for further information on water saving opportunities: www.yourbuilding.org/display/yb/Home

5 Collect data and monitor performance

Review existing water monitoring and data management capabilities, including the building management and control system. What improvements are required so that accurate data can be collected and reported at least monthly? When designing your monitoring system make sure key tenants or water intensive areas can be submetered, e.g. retail, food courts, fitness centres, carparks and HVAC equipment, such as cooling towers. Make sure the data collected:

- represents the total water used
- can be used for external benchmarking – but check the NABERS website or with your Accredited Assessor first to make sure the data you collect is useful for evaluating and achieving your NABERS targets.

Check that key service providers are able to collect data in the format and at the frequency you require. Do not rely solely on utility company invoices or statements. Check against trend performance and be conscious of which meters are being used to account for usage. Undertake a simple verification check on your water data to ensure its accuracy and comprehensiveness.

Water audits

Conduct a water audit to identify measures you can implement through incremental improvements and regular monitoring as well as larger one-off capital improvements. An audit is particularly important if the property has a history of poor water performance when compared to other similar properties on a kL/m^2 NLA basis, or if the NABERS Water ratings are consistently poor. Make sure that as an outcome of the auditing process you have a comprehensive understanding of flow rates, the water balance and likely leakage rates as well as costed options for capital projects and operational measures that will improve efficiency in the short and longer term.

You could use the checklist in Worksheet 3.6C to outline the audit scope of works as recommended by Sydney Water.

Priorities for submetering

Sydney Water recommends that priority for submetering is given to:

1 cold water supply
2 hot water supply
3 amenities
4 cooling towers
5 food courts and restaurants
6 outdoor areas and water features
7 retail shops
8 sewer discharge.

See Sydney Water's *Best practice guidelines for water conservation in commercial office buildings and shopping centres* for more detail: www.sydneywater.com.au/SavingWater/InYourBusiness/.

6 Update building maintenance and operational procedures

Review building maintenance and operational procedures to make sure that water saving measures are part of everyday activities. For example, check that:

- poor maintenance of water intensive equipment is not causing wastage
- standard building operating procedures are not allowing leaks to go unfixed.

Look for opportunities to capture and reuse water from weekly fire system tests. This can save up to 60 kL of water per test (Sydney Water).

7 Integrate water management into contracts

Review water and other services contracts to identify rewards for water conservation initiatives, e.g. water performance contracting. Build water management requirements in to other contracts, such as cleaning and subcontractors working on site. Make water conservation a key performance indicator for maintenance and controls contracts. See Section 5: 'Sustainability and the Supply Chain'.

8 Report performance monthly

Include water management in regular base building reporting. Ensure monthly reporting tracks performance against targets, and investigate variations or unusual events. This is in addition to responding to water use discrepancies if information about them is available (e.g. daily or real time monitoring). Include performance monitoring results in your monthly property sustainability report. Use Worksheet 3.4C as a guide or adapt it and integrate it into your existing monthly reports.

At team meetings discuss monthly performance and the measures taken to maintain or adjust aspects of building services so they make the best contribution to meeting your water conservation targets.

9 Engage tenants

Regularly engage with your tenants to support them in reducing their water use and keep them up-to date on the performance improvements you are working on. Make them a part of the process and let them know how you are improving their building.

Easy wins

Some common 'easy win' water conservation initiatives include the following:

- Install submetering and 'smart metering' technologies so you have better information for optimising the management and control systems for water services operational cycles.
- Install water saving devices in toilets and plumbing systems, including waterless urinal technologies, low flow taps and urinal sensors.
- Review and increase cooling tower water concentration cycles.
- Install measures to capture and recycle water used for fire systems tests.
- Identify wastage and fix leaks. In particular, check valves, taps and fittings in amenities areas, and check cooling towers for splash and drift losses.

Helping to reduce use of bottled water

By adding a reliable source of filtered water in office kitchens, you could help to reduce the use of bottled water.

Australians spent $385 million on 250 million litres of bottled water in 2006 (AC Nielson). It takes a whopping 141,666 barrels of oil just to make the resin for the plastic bottles (Polyethylene Terephthalate or PET). Then another 314,465 barrels of oil are used to convert the PET to plastic bottles, fill the bottles, transport them and refrigerate the water. This much oil adds up to over 60,000 tonnes of CO_2 emissions. So every time you drink a litre of bottled water, you're using 200 ml of oil (Pacific Institute for Studies in Development, Environment & Security).

Only 35% of bottles actually make it to a recycling depot (Plastics and Chemicals Industry Association 2005–06 report). And for those bottles that are recycled, the recycling process uses another 1,600 barrels of oil each year.

Department of Environment and Climate Change NSW

Encourage tenants to:

- report leaks promptly
- check taps are turned off
- choose water efficient appliances, such as 4-star dishwashers (see www.waterrating.gov.au)
- implement water savings measures in their fitout.

Sydney Water or your water utility can help by providing a range of educational resources such as stickers and posters about saving water.

Raise awareness on reducing water consumption by holding information sessions for tenants, and encourage tenants to reduce water use at home too. Tenants might be interested in rating their home water use compared to similar households using NABERS for homes, see www.nabers.com.au

10 Review performance annually

Review your water consumption trends.

- How have you progressed against your targets?
- What can you do over the next 12 months to improve performance?

Include water conservation in your annual resource efficiency performance review. Section 3.4 and Worksheet 3.4D provide more detail and a template for this.

Public reporting of your performance is the key to ensuring accountability and a positive corporate reputation amongst your stakeholders. Your annual review and report should include official, accredited NABERS ratings. This gives stakeholders confidence that the reported standards are reliable, and that you are committed to achieving the targets you have established.

Update your water action plan once you have completed your review.

Benefits of a water management plan

'Jones Lang Lasalle undertook an audit of water consumption at the Riverside Centre Brisbane, owned by General Property Trust.

Outcomes of the audit suggested the need for a systematic approach using a Water Management Plan. The Plan included a number of water reduction strategies associated with either cyclic maintenance or refurbishment projects.

Over a 3-year period, water efficiency measures included:

- refurbishing existing flush valves to minimise leakage
- replacing membranes around external fountains
- replacing the building cooling towers
- installing additional submetering to identify systems with high water consumption.

The team is also investigating the feasibility of diverting wastewater from the cooling towers to the toilet flusherette system or the fountain make-up water system.

Benefits include:

- saving $11,539 over a 3-year period (a combination of reduced supply and wastewater charges)
- reducing water use by 6%
- saving an estimated 7.23 megalitres of potable water which equates to five Olympic-sized swimming pools.'

'Commercial Property Going Green', Jones Lang Lasalle 2004

Further information

- Australian Building Codes Board, www.abcb.com.au
- *Best practice guidelines for water conservation in commercial office buildings and shopping centres*, Sydney Water 2007, www.sydneywater.com.au/SavingWater/InYourBusiness/
- NABERS Water, www nabers.com.au
- NSW Green Business Program, www.environment.nsw.gov.au/grants/ccfgbp.htm

- *ESD Design Guide for Office and Public Buildings*, Edition 3, Department of the Environment, Water, Heritage and the Arts, May 2007, www.environment.gov.au/settlements/publications/government/esd-design/index.html
- *Water efficiency guide: office and public buildings*, Department of Environment and Heritage, October 2006, www.environment.gov.au/settlements/publications/government/water-efficiency-guide.html
- Green Star Office Existing Building Tool, www.gbca.org.au
- Sydney Water Every Drop Counts (EDC) Business Program, www.sydneywater.com.au/SavingWater/InYourBusiness/EDCBusinessProgram.cfm.
- Water Efficiency Labelling and Standards (WELS) Scheme, www.waterrating.gov.au
- Metropolitan Water Plan, Water for Life, www.waterforlife.nsw.gov.au
- *Guidelines for Water Savings Action Plans*, www.environment.nsw.gov.au

Worksheets

Review and use these Word documents:

3.6A Water action plan

3.6B Water saving checklist

3.6C Planning a water audit – scope of work checklist

Worksheet 3.6A

Water action plan

This is an example only – adapt this worksheet to suit your organisation's requirements, and review your plan on an annual basis.

Property name:		
Address:		
NLA or GLA of building (m^2):		
Date:	Prepared by:	Approved by:
Key contractors for the following services:		
HVAC:	Plumbing (hot water):	
Cooling towers:	Landscaping:	
Metering:	Other:	

Water conservation targets for financial year: *insert your targets*

	Base building water		**Whole building water**	
	Previous year actual	**Annual target**	**Previous year actual**	**Annual target**
Total water (kL)				
Total water (kL/m^2)				
Total water per patron per day (L/patron/day)				
Total cost of water ($)				
Total cost of discharge ($)				
Total cost of trade waste ($)				
NABERS Water rating				
Other:				

Short-term opportunities

(Actions with a payback of typically less than 3 years)

	Actions or initiatives to be taken to achieve targets or potable water consumption	**Responsibility**	**Expected water savings** (kL)	**Cost to implement**	**Payback period or internal rate of return**	**Time required to implement**	**Planned completion date**	**Actual completion date**
	Amenities							
	Cooling towers and HVAC system							
	Kitchens and food courts							
	Specialist tenants including fitness centres							
	Outdoor areas and water features							
	Cleaning and tenant education (including signage)							

	Actions or initiatives to be taken to achieve targets or potable water consumption	Responsibility	Expected water savings (kL)	Cost to implement	Payback period or internal rate of return	Time required to implement	Planned completion date	Actual completion date
	Miscellaneous							

Summary for short-term opportunities

Total water savings (kL):
Total water savings as a % of total use
Total cost savings ($)
Total cost savings as a % of total cost

Sign:	Sign:
Date:	Date:

Medium-term opportunities

(Actions with a payback of typically between 3 to 5 years, often with other benefits too.)

	Actions or initiatives to be taken to achieve targets or reduce potable water consumption	Responsibility	Expected water savings (kL)	Cost to implement	Payback period or internal rate of return	Time required to implement	Planned completion date	Actual completion date
	Amenities							
	Cooling towers and HVAC system							
	Kitchens and food courts							

	Actions or initiatives to be taken to achieve targets or reduce potable water consumption	**Responsibility**	**Expected water savings** (kL)	**Cost to implement**	**Payback period or internal rate of return**	**Time required to implement**	**Planned completion date**	**Actual completion date**
	Specialist tenants including fitness centres							
	Outdoor areas and water features							
	Cleaning and tenant education (including signage)							
	Miscellaneous							

Summary for medium-term opportunities

Total water savings (kL):
Total water savings as a % of total use
Total cost savings ($)
Total cost savings as a % of total cost

Sign:	Sign:
Date:	Date:

Long-term opportunities

(Actions with a payback of typically more than 5 years, but with other significant benefits such as improved maintenance and conditions.)

	Actions or initiatives to be taken to achieve targets or reduce potable water consumption	**Responsibility**	**Expected water savings** (kL)	**Cost to implement**	**Payback period or internal rate of return**	**Time required to implement**	**Planned completion date**	**Actual completion date**
	Amenities							
	Cooling towers and HVAC system							
	Specialist tenants including fitness centres							
	Outdoor areas and water features							
	Cleaning and tenant education (including signage)							
	Miscellaneous							

Summary for long-term opportunities

Total water savings (kL):
Total water savings as a % of total use
Total cost savings ($)
Total cost savings as a % of total cost

Sign:	Sign:
Date:	Date:

Worksheet 3.6B

Water saving checklist

This is an example only – adapt this worksheet to suit your organisation's requirements.

Note: references to Chapters throughout this checklist refer to *Best practice guidelines for water conservation in commercial office buildings and shopping centres*, Sydney Water 2007.

	Yes/No	Recommended action
Managing your water		
Do you monitor and record your water use?		If no, read your meter at least daily or weekly, or install a continuous monitoring system. Record meter reading information so you can identify changes in water use.
Do you benchmark your water consumption?		If no, calculate a L/m^2/year figure and compare it against other buildings in your portfolio and the benchmarks in Chapters 3 and 4 of Sydney Water's *Best practice water conservation guidelines*, and use the free self-assessment tool available from the NABERS website (www.nabers.com.au). It may be preferable to get an accredited rating as part of your management and monitoring program.
Do you know where water is used in your office building or shopping centre?		If no, look at the average water balance graphs in Chapters 3 and 4 in Sydney Water's *Best practice water conservation guidelines* for guidance. Install submeters according to the priorities in Chapter 9 to develop your own water balance.
Do you know where the best opportunities to save water are?		If no: • check for leaks • check cooling tower operations • install flow restrictors on taps • remove all cyclical flush urinals • develop a water balance for your building and see where you are using most water.
Do you regularly review your organisation's water management?		If no, establish a management plan that incorporates water monitoring and conservation. There are tools available from water suppliers such as Sydney Water EDC Business Program or third party providers. Or use the template provided in the NSW Water Saving Action Plan guidelines and Worksheet 3.6A. Concentrate on achieving identified critical actions. Compare your results to previous reviews and rate your achievement of critical actions.
Do you review your submeters, or information from your continuous monitoring system regularly?		If no, establish work procedures so that a member of staff is responsible for water use information and knows what they need to do to if water use changes.

	Yes/No	Recommended action
Do you know how much water, and all associated charges (energy, pumping, chemical, sewer discharge) are costing your business?		If no, refer to information about the true cost of water in Chapter 6. Calculate your own water costs and associated charges. Knowing how much your water costs will establish a business case for water conservation.
Have you developed a water savings plan?		If no, look at the findings of this checklist then develop a water balance and a basic savings plan.
Do you have signs, posters and stickers in your building to encourage water conservation and remind people to report leaks?		If no, business partners in the EDC Business Program can co-brand stickers, posters and shower hangers.
Amenities		
Have you installed submeters on supply lines to amenities and hot water supply?		If no, install meters on supply lines to amenities, as described in Chapter 9. Conduct routine inspections and program maintenance to detect problems before they become large leaks.
Does your building have any cyclic flushing urinals?		If yes, replace urinals immediately with manually flushing urinals, automatic sensor units or ultra low flow or waterless urinals. Refer to Chapter 13.
Does your building have automatic on-demand urinal sensor flushing systems?		If yes, regularly check that sensors are working properly and not detecting unrelated movement. Check that solenoids are operating correctly and replace them if they are faulty or worn.
Does your building have single flush toilets?		If yes, replace single flush toilets in high use areas with 6/3 litre or 4.5/3 litre dual flush models. If toilets are in low use areas, restrict cistern volume and bring forward programmed replacement.
Does your building have dual flush toilets?		If yes, check the flush capacity. Older 11/5.5 litre and 9/4.5 litre dual flush toilets can be replaced with new 6/3 litre or 4.5/3 litre flush models.
Are cistern rubber seals on toilets replaced regularly?		If no, cistern rubber seals should be replaced every two years to prevent leaks.
Do you have a flusherette system?		If yes, check the flow rate and flush timing. Over time, wear will cause excessive flush volumes. Insert flow control regulators into valve bodies to reduce flow.
Do you have flow regulators in all hand basins?		If no, install flow regulators so that flow is reduced to at least 6 litres per minute.
Do you have water efficient showers?		If no, install flow regulators so that flow is reduced to at least 9 litres per minute or install WELS 4-star rated showerheads.
Cooling tower operations		
Does your building have cooling towers?		If yes, continue with this section. If no, go to the next section.

	Yes/No	Recommended action
Is there a water meter on the make-up water pipe?		If no, install a submeter and monitor the water consumption regularly.
When the pump is stopped, is there water flowing from the overflow drain pipe?		If yes, check that the drain valve is correctly set and if there are any leaks. Check if the valve is closed and adequately sealed.
When the pump is stopped, does the water flow out of the overflow drain pipe whilst the water is coming in through the make up water line?		If yes, this indicates that the ball float valve is incorrectly set. The ball float valve needs to be reset.
If you have a V shaped basin, when the pump stops does the cooling tower overflow?		If yes, consider installing a break tank, or a more precise make-up control.
Is there is a significant length of condenser water pipework running at high level, causing the tower overflow when the pump stops?		If yes, consider reconfiguring the pipework.
If you have two or more cooling towers interconnected, when the pump stops does water flow from the drain pipe?		If yes, check the ball float valve settings and the height of the tower basin. If one basin is higher than the other some modifications may be required.
Is the water overflowing the edge of the tower basin?		If yes, check that the overflow pipe is set correctly or not blocked.
Is the area around the tower regularly or constantly wet?		If yes, water is splashing out of the tower. Install or replace anti-splash louvres.
Is any leakage present in the tower, casing, basin, or any intake or exhaust ducts or flexible connectors?		If yes, joints need to be adjusted and sealed.
Does the cooling tower have drift eliminators, or old or ineffective eliminators?		If no, install a drift eliminator that limits drift loss to no more than 0.002%.
Do any pumps have packed gland pump seals?		If yes, ensure pumps are inspected monthly and seals tightened as needed. Also consider replacing the seals with mechanical seals.
Does your water treatment contractor clean the conductivity sensor every month?		If no, make this part of their ongoing duties. Ensure it is recalibrated every month.
Is the water treatment system installed with a bleed blockout?		If no, install a bleed blockout to ensure that unnecessary bleed does not occur during chemical dosing.
Does the cooling water system have a side stream filter that uses water for back flushing purposes?		If yes, consider capturing the bleed off in a backwash holding tank and then using it to backwash the side stream filter.

	Yes/No	Recommended action
Have you contacted your water treatment contractor to discuss increasing the cycles of concentration in your cooling tower to reduce the bleed rate?		If no, ask your contractor to do so. Water supply in Sydney should be able to be cycled to about 9. If your contractor is unable to do this, discuss opportunities of changing to a treatment system that can function effectively at high cycles of concentrations.
Does your cooling tower water treatment contract require the contractor to report back on all water leaks after each service?		If no, amend contract to ensure this occurs.
Do you have a certificate stating that an effective process of disinfection is installed and operating?		If no, make sure your contractor can supply one. These certificates are mandatory in NSW.
Cooling systems and building design		
Have you integrated economy cycle or fresh air venting into your air conditioning system?		If no, investigate if this can be done with your current HVAC equipment.
Have you reduced the heat load in your building as far as possible?		If no, install energy efficient lighting, building insulation, external shading, high performance insulation, sympathetic landscaping, and heat efficient natural lighting.
Is your cooling load under 500 kWR?		If yes, you should investigate the possibility of air cooled systems. In smaller systems, air cooled systems can be appropriate because they do not consume water and have lower maintenance costs.
Have you looked at alternative water sources for your cooling system?		Lake water, groundwater, sea water, reclaimed water, recycled water, rainwater and condensate may all be used in cooling systems.
Have you considered other cooling systems?		If no, investigate options including evaporative pre-cooled air cooled condensers with pad or spray cooling, variable refrigerant volume systems, hybrid coolers or condensers, phase change materials or chilled beam technology. These are viable alternatives to traditional cooling towers and should be investigated when building or renovating.
Kitchens and food courts		
Are the water supply lines to kitchens submetered?		If no, install sub meters on the supply lines to food businesses, especially high volume, water intensive kitchens.
Do you benchmark water use in each of the kitchens or your food court?		If no, use submetering information to establish benchmarks so you can track kitchen water use over time. Common benchmarks are litres per cover, litres per meal served, or litres per patron.
Do you have flow regulators on kitchen sinks and basins?		If no, install 9 or 12 litres per minute flow restrictors on kitchen sinks and 6 litres per minute restrictors on hand basins.

	Yes/No	Recommended action
Do you have waterless woks in your kitchen?		If no, consider installing a waterless wok. You may be able to get information and financial assistance from the Ethnic Communities Council of NSW. If you are accepting new tenancies into your food court, make the installation of waterless woks a lease condition.
Do you have a water efficient dishwasher?		If no, replace your existing model with a water efficient model. You will save money through water and energy savings.
Do staff in food courts and kitchens operate dishwashers and glass washers efficiently?		If no, ensure all staff receive information about water efficient dishwasher operation. If you are accepting new tenancies, make installation of water efficient dishwashers and glass washers a lease condition.
Do staff in food courts and kitchens rinse plates before washing?		If yes, install water efficient 6 litres per minute WELS rated pre-rinse spray valves. Sydney Water is offering a rebate system for their installation.
Do you check the condition of pre-rinse spray valves?		If no, inspect pre-rinse spray valves every 2 weeks to check for leaks and worn valves. Worn valves waste water and reduce cleaning efficiency.
Do staff in food courts and kitchens leave taps running while they are cooking and cleaning?		If yes, install signs to remind staff to turn taps off. Consider installing sensor taps or foot-operated taps. Waterless woks have hip controls and automatic turn off swivel taps.
Are kitchen floors and food court areas hosed down?		If yes, consider using mops or squeegees instead of hoses. Microfibre mops are highly water efficient. If hoses must be used, ensure they are fitted with trigger nozzles.
Is food ever defrosted under running water?		If yes, ensure all food is defrosted in a refrigerator, or in a microwave if it is to be cooked immediately.
Are water cooled steamers used?		If yes, install more efficient steamer equipment. Efficient steamers can use up to 90% less water and up to 60% less energy than older models and have shorter cook times, higher production rates and reduced heat losses.
Do tenants pay for their own water consumption?		If no, you may be able to establish leases so that submetering information can be used to charge tenants for their water consumption. This gives each tenant a financial incentive for water conservation.
Fitness centres		
Does your building contain a fitness centre?		If yes, continue with this section. If no, go to the next section of this checklist.
Are the showers water efficient?		If no, install 9 litres per minute flow restrictors or WELS 3-star rated showerheads on showers.
Do you have flow regulators in all hand basins?		If no, install flow regulators so that flow is reduced to 6 litres per minute or less.

	Yes/No	Recommended action
Does the fitness centre contain a swimming pool?		Ensure you submeter supply and refer to the Sydney Water fact sheet *Swimming pools* for benchmarking and water conservation information.
Outdoor areas and water features		
Do you have a landscaped area or water features?		If yes, continue with this section.
Do you submeter your irrigation supply and water features?		If no, consider installing submeters to determine your water use and identify leaks. This is especially important if you have large areas of irrigated areas or large water features.
Do you improve your soils?		Improving soil quality can improve plant growth and water retention. Add organic matter such as compost or composted animal manure.
Do you use an alternative water source to irrigate your garden?		If no, consider using rainwater, stormwater or treated wastewater for irrigation.
Cleaning		
Do you communicate with cleaning staff regularly?		If no, cleaning staff will need information about water wise cleaning techniques and the correct way to clean specialised equipment such as waterless urinals. You could use Sydney Water EDC Business Program stickers, posters and fact sheets to communicate with staff.
Do cleaners hose down floors or carparks?		If yes, remember that water restrictions prohibit the hosing of hard surfaces. Use brooms or mops to clean floors, or use rainwater or other water sources if you must use the hose. In most large carparks, commercial street or footpath cleaning equipment can be used.

Source: *Best practice guidelines for water conservation in commercial office buildings and shopping centres*, Sydney Water 2007, www.sydneywater.com.au/SavingWater/InYourBusiness/

Worksheet 3.6C

Planning a water audit – scope of work checklist

This is an example only – adapt this worksheet to suit your organisation's requirements.
Source: Adapted from Sydney Water's Every Drop Counts Business Program.

	Include in audit? Yes/No
Objectives	
General objective – e.g. to carry out a comprehensive water efficiency audit to achieve the following:	
Identify current water usage patterns	
Benchmark water use against standard or best industry practices	
Describe the current hydraulics system and identify any deficiencies	
Identify water conservation opportunities (including reuse and rainfall capture)	
Document the extent of existing water efficiency, reuse and rainfall capture	
Recommend plumbing retro-fit and other water saving initiatives, demonstrating the costs and savings including payback period.	
General methodology	
To carry out a comprehensive water audit in an efficient manner that is least disturbing to the building/centre occupants, the audit may involve:	
On-site investigation to quantify water usage at each of the following:	
Amenities – toilets, basins, showers, urinals and kitchen fittings	
Air conditioning systems and cooling towers	
Cleaning and house keeping	
Grounds maintenance	
Fire Services	
Other water-using fixtures and equipment	
Review of owner's plumbing maintenance practices	
Leakage measurement through flow metering	
Review existing water meter size (for possible downsizing)	
Review building's water reuse arrangements (if any are in place)	
Specific measures:	
Meeting with Building Management to discuss audit, access to information, documentation and a walk-through of the building/centre	
Inspecting water services, meters, pumps, reservoirs, tanks and water fixtures throughout the building/centre	
Inspecting all relevant water services plans	
Obtaining water meter readings from the local provider for the past 3 years and assessing this information to determine usage trends	
Installing a pulse unit and data loggers for submeters (existing or specifically installed for audit)	
Installing acoustic flow meters to monitor flow profile and usage – at supply-to-main domestic storage and fire hydrant tanks; and at water-out-of-main domestic water tanks	

	Include in audit? Yes/No
Flow testing water fixtures throughout the building/centre	
Analysing data obtained to determine daily usage and base flows	
Installing people counters at entrances to support normalisation of usage data	
System modelling over X days to identify usage for various areas or equipment within the building/centre	
Assessing base flow in system and calculating water charges	
Identifying and assessing water saving options	

Managing waste and recycling

3.7

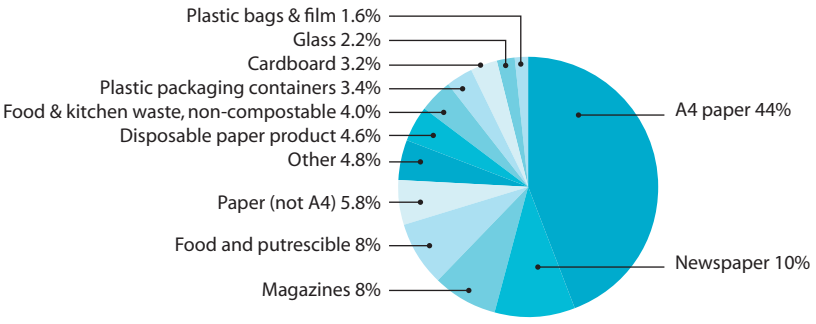
Context

More than 75% of all unwanted material generated in offices is paper or cardboard. Cardboard and packaging are also a significant proportion of the waste flow from a retail centre. Depending on the tenant mix, up to 40% of retail centre waste is organic and opportunities to divert this from landfill are increasing. For example, organic matter such as food waste can be diverted from landfill to alternate waste technology facilities such as Earthpower or UR3R. This means you have an excellent opportunity to divert a large proportion of your waste to recycling.

Having an effective waste and recycling system is a vital part of your sustainable building operations. Your waste and recycling system is a key interface between you and tenants, and tenants' participation in separating materials for recycling is critical to its success.

Achieving good recycling rates has a number of benefits, including:

- reducing running costs by avoiding landfill charges – in NSW the waste levy for the Sydney region and the Hunter, Central Coast and Illawarra will increase by $10 per tonne per year, indexed to CPI, from 1 July 2009 until 2015–16
- reducing your greenhouse gas emissions and hence your overall carbon footprint by minimising emissions from landfills and from extraction of new materials
- providing an excellent opportunity for you to work closely with your tenants and to help them save money by, for example, reducing waste through measures such as using less paper and reducing waste disposal costs.



Typical composition of waste and recyclables generated in Sydney offices 2006

Average of all systems.
Percentage by weight 'as received'.

What's in this section

Steps: Managing waste and recycling

1 Measure baseline performance

Gather information to establish baseline data for your waste and recycling infrastructure and current waste and recycling flows. You could use the waste and recycling review in Worksheet 3.7A as a guide. Gather the following information:

- What type of waste and recycling systems are already in place in tenancies and base building areas? Note the types of bins and waste handling equipment such as balers, compactors etc.
- Identify whether waste and recycling bins are available in high waste generating areas, e.g. photocopying and document preparation areas or food courts and retail tenant areas.
- Determine whether contamination in the recycling stream has been an issue, and if so, find out the details.
- Collate your current waste and recycling tonnes or volume. Will you be able to report performance data monthly?
- Find out whether contracts provide for reporting of waste tonnages.

Optimising your waste and recycling system is an ongoing process. You will need to make sure there are regular system checks (e.g. for contamination rates, signage and bin configurations and tenant participation) in order to keep tenant participation rates high. Actions resulting from your regular system checks can form the basis of your waste and recycling action plan (Step 4).

2 Benchmark performance

An important part of assessing your baseline performance is comparing your building's waste and recycling generation rates and recycling performance with others in the market. Use the NABERS Waste rating tool to benchmark your property (www.nabers.com.au). Under NABERS Waste, three types of ratings are available: a base building rating, a tenancy rating, and a whole building rating, which considers both the base building and tenancy performance.

When your building or portfolio is rated against the benchmarks, you need to ask:

- How does your building or portfolio compare?
- What percentage of your portfolio is below or above average?

Key things we know about waste and recycling in offices

- If you have a recycling system tenants generally will participate.
- Typical recycling rates range from 60–70% of waste generated.
- Within a tenancy, different people (depending on their job function) will be high generators of waste and low generators, but we know they are very consistent. The amount of waste generated and recycled by office workers 'week to week' is remarkably consistent.
- Offices with the highest amount of double-sided printing throw out less waste and use dramatically less paper.
- More waste appears to be placed in bins when each desk has a waste bin.

Department of Environment and Climate Change NSW

NABERS

About NABERS

NABERS is the National Australian Built Environment Rating System managed by the Department of Environment and Climate Change NSW. NABERS is a performance-based rating system which measures the operational environmental impacts of existing buildings.

NABERS office tools can be applied to three distinct situations:

- **Tenancy** ratings that cover the space occupied by a single tenant and under the control of that tenant
- **Base Building** ratings that cover all office spaces for that building, and measure the parameters that are under the control of the landlord or base building
- **Whole Building** ratings that are a combination of both Tenancy and Base Building for the situation where a tenant is the owner and/or has control of all services.

For more information see www.nabers.com.au

- Is this acceptable for the market positioning of your building or portfolio?
- What are the ramifications for obtaining and retaining environmentally aware tenants?
- What are the ramifications for the value of your asset?

Use the benchmarks to set improvement targets and to identify and prioritise properties that may need immediate action. See Section 3.4, Step 2, for more information about benchmarking using NABERS. Note that NABERS Waste is based on an amount of waste generated per person, therefore you will need accurate occupancy data (e.g. a computer count which represents the number of frequently used computers – not the number in the asset register.)

Self assessment

You can self-assess building environmental performance at no cost using the NABERS performance rating calculator (see www.nabers.com.au). The calculator is applicable to base buildings, tenancies and whole buildings.

Self-assessment can help you get a rough idea of performance, but you need to be careful that the information you enter is as accurate as possible and conforms to the data needed by the calculators.

For example, if you're using the base building waste calculator, the area should be based on the net lettable area (NLA) minus spaces that can be excluded such as retail areas in office buildings, and the data needs to relate only to the part of the building being rated, e.g. the base building. If the information you enter is not accurate the results can be misleading. If you are uncertain about self-assessment look for further information on the NABERS website or seek advice from a NABERS Accredited Assessor.

Accredited assessment

To ensure the accuracy of the results you obtain, and to use the rating to promote your property or organisation, or to use the NABERS trademarks, you must obtain a certified rating from a NABERS Accredited Assessor. Make sure you use an assessor with good knowledge of sustainability practices in both commercial property design and management. A list of assessors is available at www.nabers.com.au. An Accredited Assessor can also give you general advice or help you with an unofficial self-assessment.

DECC policy on bottled water

The environmental costs of bottled water (producing, transporting, refrigerating and disposing of the bottles) has led the Department of Environment and Climate Change NSW (DECC) to eliminate all non-essential purchasing of bottled water. The only bottled water purchased by DECC will be where there is an occupational health and safety requirement, such as for staff fighting fires, conducting fieldwork or working in remote locations without a reliable water supply. Staff can purchase their own bottled water, but are asked to think twice before doing so, and consider refilling bottles from the tap.

Australians spent $385 million on 250 million litres of bottled water in 2006 (AC Nielson). Tap water costs about $1 per cubic metre or 1,000 litres. Bottled water at $2.50 a 600 ml bottle costs over $4,100 a cubic metre. It takes a whopping 141,666 barrels of oil just to make the resin for the plastic bottles (Polyethylene Terephthalate or PET). Then another 314,465 barrels of oil are used to convert the PET to plastic bottles, fill the bottles, transport them and refrigerate the water. This much oil adds up to over 60,000 tonnes of CO_2 emissions. So every time you drink a litre of bottled water, you're using 200 ml of oil (Pacific Institute for Studies in Development, Environment & Security).

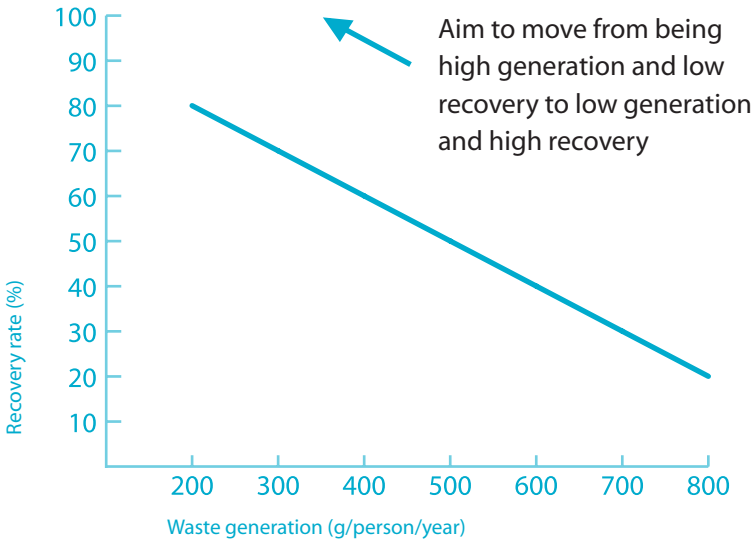
Only 35% of bottles actually make it to a recycling depot (Plastics and Chemicals Industry Association 2005–06 report). And for those bottles that are recycled, the recycling process uses another 1,600 barrels of oil each year.

Department of Environment and Climate Change NSW

3 Set performance targets

Set firm targets and milestones for reducing waste and optimising recycling. Targets should be twofold, relating to:

- reducing the overall amount of waste generated (total waste generated = waste to disposal + recycling)
- maximising the amount of material recycled.



You may wish to articulate your waste and recycling commitments and targets in a dedicated waste and recycling management policy or as part of your overall sustainability policy (See Section 2.3: 'Developing a sustainability policy for your organisation'.)

When setting targets ask the following questions:

- How do your targets compare with your peers in the market?
- Have you informed your internal and external stakeholders of the targets? Do the targets meet the stakeholders' current and future expectations?
- Can you verify progress in relation to the targets? Report your success rate back to staff to increase confidence that recyclables are being recycled.

Source or write articles for staff newsletters or email distribution that increase awareness of landfill issues and products produced from recycled materials.

Allocate responsibility for achieving the targets. Where applicable, integrate the targets and minimum standards into service or performance contracts with relevant service providers and staff performance agreements. Make sure your targets are not hidden in a report. Make them part of 'business as usual' operations. Promote targets to key stakeholders and ensure they understand the process you have committed to and the intended benefits.

Waste and recycling performance target examples

Examples of targets include:

- increasing the base building's NABERS Waste rating by 2 stars within a 12-month timeframe (be sure to set a specific date)
- increasing recycling rates to 80% of total waste generated
- reducing waste generation by 20%
- reducing contamination rates of recyclables to less than 2%
- increasing tenant participation in recycling to over 95% of building tenants.

Portfolio targets might include:

- achieving an average 4-star NABERS Waste rating across the portfolio by 2010
- achieving recycling rates of over 70%
- reducing waste generation by 20%.

Choosing a bin configuration

There are a number of recycling bin configurations available. To choose one that is appropriate for your situation you need to look at:

- what materials you want to collect e.g. paper-only, mixed paper including cardboard, co-mingled containers (drink bottles, aluminium cans), wet/dry systems (where putrescible waste is separated from dry material and recyclables)
- whether recycling materials will be separated on site by users, e.g. having paper-only bins, or using co-mingled bins which rely on off-site processing to separate materials
- the cleaning costs, e.g. emptying bins on a daily basis or less frequently.

Consider removing waste bins adjacent to desks and having a central recycling area. Research by the Department of Environment and Climate Change NSW shows that removing general waste bins can result in less waste being generated overall. Make sure materials separated for recycling in the office don't end up in the building's general waste dumpster.

4 Develop a waste and recycling action plan

Develop an action plan to improve your recycling performance and reduce waste generated within your building. The plan should identify responsibilities and timeframes for action. You could use Worksheet 3.7B as a guide.

Setting up a new waste and recycling system

If you don't already have a recycling system in place, work with your cleaners and waste contractors to set up your system.

- Identify the materials you want to divert and the materials accepted for recycling by your existing or potential waste contractors.
- Identify which system is best suited for the materials you want to collect, the types of tenants you have, how often bins are to be cleared (e.g. daily for putrescible waste) and how it will impact on your cleaning contract (e.g. number of bins to be collected daily)
- Ask your tenants if they have any special requests (e.g. secure destruction service) or if they have their own recycling programs in place (e.g. toner cartridge recycling). Look for opportunities to share services as this could reduce the number of trips collectors need to make to your building thereby reducing transport impacts.
- Identify high waste and recycling generation points to ensure that adequate recycling and waste bins are provided e.g. paper recycling in photocopy or utility rooms, organic waste bins in retail food preparation areas.
- Set up clear signage and instructions on how to use the system, including what can be recycled. You should be able to see the signage from at least 5 m away. Standard recycling signs can be found at www.environment.nsw.gov.au/warr/RecyclingSigns.htm
- All bins need to conform to AS 4123.7-2006: Mobile waste containers – *Colours, markings and designation requirements*.
- Educate your cleaners and tenants on how to use the system and don't forget to tell them about the benefits of being involved.
- Make sure the recycling gets recycled.

For more information see 'Waste Reduction in Office Buildings': www.environment.nsw.gov.au/sustainbus/buildingsandoffice.htm

Improving an existing system

To keep your existing waste and recycling system running at its optimum level, carry out regular checks:

- Encourage consistent separation of paper and cardboard from co-mingled recycling and general waste streams.
- Ensure correct bins, colour-coded bags and signage remains in place (at desks, kitchen areas, in shops or in food court areas).
- Identify non-participants or places where tenants have made changes to the system. Determine whether more education is required or if the system needs to be modified e.g. adding extra recycling bins.
- Identify any issues with collection and transfer of material to centralised areas and loading docks (e.g. avoid cardboard boxes piling up and blocking walkways).
- Identify opportunities to expand the range of material collected e.g. toner cartridges, mobile phones, fluorescent lamps and electronic waste. Arrange for regular clearance to suit the amounts collected. If tenants are already have their own programs in place, look for opportunities to collaborate in a building-based collection to help other tenants get involved and reduce overall transport impacts.
- Keep tenants up-to-date so they know about any system upgrades e.g. new materials that can be recycled, and so continuing problems can be addressed.

5 Collect data and monitor performance

Work with your cleaning and waste removal service providers to collect data by weight. Often waste and recycling data is provided as a volume measurement, or is based on frequency with a number of bin lifts per week. Converting volume to weight is often problematic due to the variable nature of waste and recycling, e.g. one empty cardboard box can fill half a 240-litre mobile garbage bin and weigh only a small amount. While weights may not be available in the short term, work towards a system where weight can be accurately reported at least monthly.

What do the terms mean?

- Total waste generation = waste sent to disposal + waste sent to recycling.
- Recycling rate = (material recovered – contamination) /total waste generation.

Sometimes there can be a difference between the amount of material you recover and how much is actually recycled. The recycling rate can be affected by:

- contamination rates – this is material that is not accepted for recycling in a particular recycling stream; for example, for source-segregated paper recycling this means any non-paper products (even if they are recyclable). Contamination can cost you money if your recycling load is rejected and sent to landfill
- the sorting efficiency of the recycling processing facility – for co-mingled recycling streams your recycling rate can be affected by the effectiveness of the recovery facility's sorting processes.

Carry out verification checks on the sorting facility your recycling materials are sent to, to make sure the materials are being diverted from landfill.

6 Update cleaning and operational procedures

Work with your cleaners to review cleaning and waste removal procedures and ensure that good recycling practices are part of everyday activities. Make sure cleaners and maintenance staff understand the waste and recycling system, including:

- which materials are accepted in each container and which are not (minimising contamination)
- which colour-coded bag to use (use of transparent bags for recycling helps cleaners identify contamination)
- which designated lift and storage areas to use.

Conducting waste and recycling audits

It's good practice to carry out waste audits to provide a detailed analysis of waste and recycling flows, the savings that can be made, and the cost of achieving those savings.

When planning your audits and assessments clearly identify the outcomes you want to achieve. For example, do you want to:

- Design your new recycling system? The audit should focus on identifying the material available for recycling.
- Check for contamination? Organise cleaners to carry out more regular system checks.
- Track your recycling and waste flows? Make sure it can be repeated regularly.
- Benchmark your property using NABERS Waste? You'll need to conduct your audit using the NABERS Waste protocol. Talk to a NABERS Assessor for more information, www.nabers.com.au.
- Verify the off-site sorting efficiency, i.e. the sorting efficiency of the recovery facility your recycling materials are sent to? A third-party auditor might be appropriate.
- Work out your carbon/ecological footprint? To calculate your greenhouse gas impacts you'll need to identify the amount and composition of waste going to landfill. Any material being diverted and recycled will not add to your greenhouse gas emissions.

For more information on how plan an office waste audit see *A WRAPP Guide to conducting an Office Waste Assessment*: www.wrapp.nsw.gov.au/education/WA_course/howtoguide0615.pdf

Regularly engage with cleaners to ensure they understand the importance of reducing waste and optimising recycling. Make sure all workers and contractors involved with cleaning and waste understand their responsibilities and know how to:

- collect recyclable material and keep it separate from the general waste stream
- keep waste storage and handling areas clean and tidy, without creating litter by allowing bins to overflow
- safely use waste handling equipment such as compactors, balers and bin lifting equipment.

Dealing with specific waste types

Office electronics, equipment and furniture

Set aside space for infrequent waste flows from office equipment (including electronic waste (e-waste) such as computers and televisions). Investigate opportunities for reuse through charities or auction houses or recyclers that specialise in e-waste. Refer to www.environment.nsw.gov.au/warr/ewaste.htm for more information.

Construction and demolition materials

Ensure waste and recycling material from retrofits and service contracts is well managed. For example, include appropriate provisions for waste and recycling management in construction contracts or service contracts. The provisions could include a requirement for an approved waste and recycling plan, or could specify recycling rates etc. Refer to www.environment.nsw.gov.au/warr/CnDWasteStream.htm for more information.

Hazardous and liquid wastes

Ensure any hazardous or liquid wastes such as waste oil, solvents, paints and other chemical wastes are appropriately managed. Undertake an assessment of the waste management practices you and your tenants such as drycleaners, photo processors, clinics and surgeries have for these wastes. For more information see the liquid waste factsheets at www.environment.nsw.gov.au/waste/liquidwastefs.htm

7 Update waste and recycling contracts

Review cleaning, waste and recycling contracts and set performance standards to ensure that accurate and regular (e.g. monthly) data can be collected. Build a monthly review into contracts to check the performance of the system. It's also a good idea to include regular tenant education on how to use the system as part of your cleaning, waste and recycling contracts.

Meeting an ambitious target for recycled or reused materials

While developing their new Sydney office, Stockland achieved an ambitious target of using 80% recycled or reused materials. For a new build this is not such a difficult achievement. However, for an existing building, where remaining tenancy furniture from more than ten different tenants on eight different levels had to be managed, this was a significant challenge. For example, although plasterboard offcuts can be recycled, painted plasterboard will not be accepted by any recycling operations.

'Specialist demolition contractors deconstructed the floorplate and recycled or onsold items. The builder sorted waste on site during the construction phase. Through a balance of working with suppliers and industry partners Stockland significantly reduced the waste output from a major construction site. When Stockland moved from their existing offices they applied similar principles, including managing to give most workstations away to Mission Australia. Stockland's office now diverts over 85% of waste from landfill.'

Stockland, www.stockland.com.au

Worksheets

- See Worksheet 3.7C for issues to address in a waste collection contract.
- See Worksheet 3.7D for model clauses that can be included in cleaning contracts.

8 Report performance monthly

Include waste and recycling management in regular base building reporting. Report monthly so you can track and understand variations or unusual events such as tenant clean-outs. An example of a monthly review is provided in Worksheet3.7A.

Include performance monitoring results in your monthly property sustainability report Use Worksheet 3.4C as a guide or adapt it and integrate it into your existing monthly reports.

Highlight steps that need to be taken to improve performance and progress towards meeting your targets.

9 Engage tenants

Regularly engage with your tenants to support them in reducing waste and optimising recycling. Keep them up-to-date on the performance improvements you are working on. Some tenants may be entirely unaware of the waste they create and hence have no drivers to encourage diverting material to recycling.

Encourage tenants to adopt waste avoidance methods such as double-sided printing. DECC research shows that offices with high doubled-sided printing rates have lower waste generation rates. It is also important to close the recycling loop and encourage the purchase of recycled content paper – the higher the better. Other ways to reduce waste include encouraging tenants to:

- think before they print – do all emails need to be printed?
- use reusable mugs, crockery, bottles and glasses (many coffee shops provide a discount to users)
- provide filtered water and reduce the reliance on bottled water (see sidebar on page 3 of this section)
- reduce the number of plastic bags they use
- think of other ways to reduce their waste through purchasing strategies such as reusable packaging.

See Section 3.3: 'Tenant engagement and green leases' and Section 5: 'Sustainability and the Supply Chain' for more information.

10 Review performance annually

Review and report your waste and recycling performance on a yearly basis too. How have you progressed against your targets? What can you do over the next 12 months to improve performance?

Include waste and recycling in your Annual Resource Efficiency Performance Review. Section 3.4 and Worksheet 3.4D provide more detail and a template for this.

Greater awareness after refurbishment

'While many tenants are implementing effective office waste recycling schemes, excessive amounts of recyclable material are still finding their way into landfills.

The Direct Property Investment Fund (DPIF), one of the unlisted property funds within Colonial First State Global Asset Management, used a major building refurbishment as the vehicle to introduce a new recycling system. After a situation appraisal through on-site audits, managing agents Colliers International, in collaboration with cleaners, waste removal companies and tenants, introduced a new recycling system focused on paper, cardboard and recyclable containers.

After a short promotion campaign the results have been outstanding, with the overall recycling rate increasing from 32% to 62% over a 6-month period. The diversion of 67 tonnes of waste from landfill is equated to saving 107 tonnes of greenhouse gas emissions, 874 trees, 188 barrels of oil, 275,632 kWh of electricity or 2.13 ML of water. The next step is an organics waste recycling initiative.'

Colonial First State Global Asset Management, www.cfsgam.com.au

Environmental benefits of recycling

A 'Benefits of Recycling' study found that, by recycling, each year NSW households are saving 2,654 Olympic-sized swimming pools of water, the annual electricity requirements of almost 334,000 households and taking 55,000 cars off the road permanently. For more information see www.environment.nsw.gov.au/warr/BenefitRecycling.htm

Public reporting of your performance is critical to ensuring accountability and a positive corporate reputation among your stakeholders. Your annual review and report should include official, accredited NABERS ratings (see www.nabers.com.au for more information). This gives stakeholders confidence that the reported standards are reliable, and that you are committed to achieving the targets you have established.

Update your waste and recycling action plan once you have completed each annual review.

Further information

- *ESD Design Guide for Office and Public Buildings*, Edition 3, Department of the Environment, Water, Heritage and the Arts, May 2007, www.environment.gov.au/settlements/publications/government/esd-design/index.html
- Department of Environment and Climate Change, www.environment.nsw.gov.au/waste/ and the 'Benefits of Recycling Calculator', www.environment.nsw.gov.au/warr/BenefitRecycling.htm
- *Know your printing paper: A guide to purchasing recycled content printing paper for corporate stationery and promotional materials*, www.environment.nsw.gov.au/sustainbus/officewasteguides.htm
- NABERS Waste, www.nabers.com.au
- Waste Reduction and Purchasing Policy, including the *WRAPP Guide to Conducting an Office Waste Assessment,* www.wrapp.nsw.gov.au/
- *Waste Reduction in Office Buildings – A Guide for Building Managers*, Resource NSW 2002, www.environment.nsw.gov.au/sustainbus/buildingsandoffice.htm
- NSW Waste Avoidance and Resource Recovery Strategy 2007, www.environment.nsw.gov.au/warr/WARRStrategy2007.htm
- Recycling signs, www.environment.nsw.gov.au/warr/RecyclingSigns.htm
- E-waste, www.environment.nsw.gov.au/warr/ewaste.htm
- Construction and demolition waste, www.environment.nsw.gov.au/warr/CnDWasteStream.htm
- Liquid waste, www.environment.nsw.gov.au/waste/liquidwastefs.htm

Worksheets

Review and use these Word documents:

3.7A Property waste and recycling review

3.7B Waste and recycling action plan

3.7C Waste collection contract checklist

3.7D Clauses for cleaning, waste and recycling contracts

Using contracts to support waste reporting

'Until recently, waste and recycling data collection has been a low priority for building managers, and so property owners have had little information to from which to measure potential sustainability initiatives.

The Direct Property Investment Fund (DPIF), one of the unlisted property funds within Colonial First State Global Asset Management, has overcome this by developing an enhanced cleaning and waste service contract on three buildings in Sydney, totalling 43,000 m^2 NLA. Through a revised cleaning tender, incorporating waste management reporting requirements as part of the contractual obligations, detailed information on waste streams has become available. Previously there was little or no quantified information. Accuracy has improved by an order of magnitude.

The benefits are significant:

- Cost of new cleaning contracts has reduced 7% yet there have been significant increases in waste collection and recycling.
- There is now credible base data which can be used to benchmark new tenant waste minimisation and recycling initiatives.'

Colonial First State Global Asset Management, www.cfsgam.com.au

Know your printing paper

Published by DECC, *Know your printing paper: A guide to purchasing recycled content printing paper for corporate stationery and promotional materials* is a guide to help printers, graphic designers and their customers to choose recycled printing paper. It lists all recycled content printing paper available for corporate stationery and promotional materials, along with paper specifications, characteristics and environmental labels. The guide also discusses the environmental benefits of recycled paper manufacture and describes the meaning of labels and certifications.

www.environment.nsw.gov.au/sustainbus/officewasteguides.htm

Worksheet 3.7A

Property waste and recycling review

This is an example only – adapt this worksheet to suit your organisation's requirements.

Property or retail centre name and address:		
Review date:	Reviewer:	Approved by:
Floors and tenancies audited:		
No. of occupants (e.g. for an office, a computer count)		
Current cleaning/waste contractors (1):		Contact name: Phone/fax:
Current cleaning/waste contractors (2):		Contact name: Phone/fax:

Item	*Yes/No/NA*	*Comment/Action required*	*Action #*
Waste and recycling action plan			
Is there an approved Waste and Recycling Action Plan (WRAP) or similar being implemented?		See Worksheet 3.7B for Waste and Recycling Action Plan template	
Is there an induction program for new tenants, cleaners and contractors to help them understand the waste and recycling management system?		(As a minimum, incorporate into an induction procedure an understanding of the waste and recycling system and responsibilities in regard to appropriate materials handling.)	
Cleaning and waste contract			
Do current cleaning and waste contracts provide for separation of recyclables? If so, list the recyclables collected.		Update contracts to include recycling, or expand the range of materials collected for recycling e.g. paper, cardboard, organics, co-mingled containers, toner cartridges etc. (See Worksheet 3.7C for an outline of issues to address in new waste and recycling contracts.)	
Do current cleaning and waste contracts require regular reporting of waste and recycling flows? If so, is the data reported by weight or volume?		Update contracts to include monthly reporting of waste and recycling data (by weight where possible).	
Are the relevant specific responsibilities of the cleaning and waste contractors being implemented satisfactorily? If not, list non-conformances.		Work with contractors to improve performance.	
List observations on the execution of tenants' waste contracts (where applicable) e.g. container management, signage, odour and litter.		Work with tenants and tenants' contractors to improve handling of waste and recycling.	
Tenancy waste facilities			
Answer these questions in conjunction with the following Tenancy waste and recycling configuration			
Is signage on tenant waste and recycling bins visible and appropriate?		(Note bin locations where new signage or new recycling containers are required.)	

Item	*Yes/No/NA*	*Comment/Action required*	*Action #*
Are recycling bins missing and needing replacing?		Identify number and location of containers to be replaced	
Are individual and centralised waste and recycling bins being used as intended?		(Describe any modifications made by user i.e. introduced extra bins. If impacting on the system then raise with tenant.)	
Are recycling bins located in areas of high waste generation, e.g. paper recycling in photocopy rooms, containers in staff kitchens, organics in food prep. areas, paper towels in bathrooms?			
Identify the level of contamination in the individual and central recycling bins (as a %). Note typical and major contaminants in each stream (e.g. food).		(Low, moderate but acceptable, unacceptable [1])	
Is the contractor using the required bag colour?		(Consider using transparent bags for recyclables to allow contamination and recyclables to be easily identified.)	
Are the right bags going into the right trolleys?		Work with cleaners to ensure recycling is not mixed with general waste.	
Other observations:			

Tenancy waste and recycling configuration

Describe tenant recycling bin configuration	*Describe size and number of containers*	*Frequency of collection*	*Observations/ Contamination issues*	*Actions/Improvements*
Office areas: Under-desk general waste bin				
❑ General waste	e.g. 20 L waste bin with black waste bag	e.g. cleaner empties daily into black bags		
❑ No waste bin (recycling only)				
❑ Wet waste				
Office areas: Under-desk recycling container				
❑ Paper only	e.g. cardboard box at each desk	e.g. tenant empties as required to centralised bin	e.g. missing recycling boxes	e.g. replace 6 missing recycling boxes on Floor A
❑ Mixed paper: newsprint, cardboard, magazines				
❑ Co-mingled containers				
❑ Co-mingled containers plus mixed paper				
❑ Dry waste				

[1] Unacceptable – high probability that recycling collector or recycling treatment process will reject the load. Refer back to waste management plan allowable contamination rates.

Describe tenant recycling bin configuration	*Describe size and number of containers*	*Frequency of collection*	*Observations/ Contamination issues*	*Actions/Improvements*
Office areas: Centralised recycling bins				
❑ General waste				
❑ Paper only				
❑ Mixed paper – newsprint, cardboard, magazines				e.g. improve signage on centralised bins, add extra recycling bin in photocopy room
❑ Co-mingled containers				
❑ Co-mingled containers plus mixed paper				
❑ Secure waste				
❑ Dry waste				
Office kitchens, bathrooms etc.: Centralised bins				
❑ General waste				
❑ Mixed paper – newsprint, cardboard, magazines, paper towels				Note: paper recycling streams can be subject to high contamination in kitchen areas therefore sometimes better to limit to paper towel recycling only.
❑ Paper towel				
❑ Co-mingled containers				
❑ Co-mingled containers plus mixed paper				
❑ Organic waste				
❑ Wet waste				
Other centralised recycling:				
❑ Loose cardboard	At lift			
❑ Toner cartridges	In all utility rooms			
❑ Mobile phones	At reception			
❑ Batteries	At reception			
❑ Reusable stationery				
❑ Other (internal cafés, child care facilities, gyms etc.) Describe system and bin configuration				
Retail areas: General retail tenants				
❑ General waste				
❑ Cardboard				

Describe tenant recycling bin configuration	*Describe size and number of containers*	*Frequency of collection*	*Observations/ Contamination issues*	*Actions/Improvements*
❑ Co-mingled containers				
❑ Co-mingled containers plus mixed paper				
❑ Organic waste				
❑ Wet waste				
❑ Mixed cardboard, paper, magazines				
❑ Other: (e.g. coat hangers)				
Retail areas: Food court tenants				
❑ General waste				
❑ Cardboard				
❑ Co-mingled containers			If co-mingled, list recyclables accepted	
❑ Glass bottles				
❑ Plastic containers				
❑ Aluminium and steel cans				
Retail areas: General areas and food court				
❑ General waste				
❑ Cardboard				
❑ Co-mingled containers			If co-mingled, list recyclables accepted	
❑ Glass bottles				
❑ Plastic containers				
❑ Aluminium and steel cans				
❑ Other:				
Retail areas: Major tenants				
❑ General waste				
❑ Cardboard				
❑ Other				
Detail specialist waste streams (e.g. solvents from drycleaners etc.) and responsibility for their management.				
Other:				

Describe tenant recycling bin configuration	*Describe size and number of containers*	*Frequency of collection*	*Observations/ Contamination issues*	*Actions/Improvements*

Item	*Yes/No/NA*	*Comment/Action required*	*Action #*
Transfer of waste and recycling to base building handling areas			
Is cleaners' access to transfer bins via a specific route e.g. goods lift?		Ensure waste handling procedures clearly describe collection and access to minimise tenant disturbance especially if office hours cleaning is undertaken.	
Are access-ways adequate for the size and type of bins being used?		Can any improvements be made if corridors or lifts are not of adequate size, e.g. smaller bins collected more often?	
Do tenants with their own services (e.g. secure paper) use the same access route? Any issues?		Work with tenants to develop procedures to reduce disturbance from transferring bins to centralised waste handling and storage areas.	
Waste and recycling handling areas/compound			
Answer these questions in conjunction with the 'Base building recycling and waste form' (see page 8).			
Are waste and recycling bins handling areas appropriately located and of adequate size?		If handling areas are under-capacity consider more frequent collections.	
Are waste and recycling bins or containers colour-coded, signposted and properly used?		Ensure signage can be viewed at least 5 m away.	
Are the correct bags being placed in the correct containers?		Consider colour coding bin floor areas to ensure that recycling and waste bins are not confused.	
Are waste and recycling bins and handling areas being maintained as required?		Keep waste handling areas clean and tidy to encourage proper use of the area. If bins are constantly overflowing, investigate options for compactors or cardboard balers to reduce bulk.	
Are waste and recycling bins adequately covered?		Ensure bins are secure and rainwater etc. cannot access bins.	
Is there provision for regular bin washing? Who is responsible for washing bins e.g. contractor?		If washed on-site ensure bin washdown area is connected to sewer.	
Is there adequate access and storage for tenant secure paper bins or specialist recycling services such as toner cartridges, computers, e-waste, batteries, paints, solvents, fluorescent tubes etc.			
Is there space for furniture and other reusable equipment or a strategy to send to reuse options (e.g. charities) rather than disposal?			
Are there any hazardous or classified wastes in any waste or recycling containers?		Keep classified waste in a separate secure area.	

Item	*Yes/No/NA*	*Comment/Action required*	*Action #*
Does the waste handling area have adequate bunding and connection to sewer?		If storing waste liquids see DECC bunding and spill management guidelines (www.environment.nsw.gov.au/water/bundingspill.htm)	
Are measures in place to ensure secure paper bin storage and collection is adequately secure?			
Are building contractors required to have a construction and demolition waste management plan?		Make sure building contractors understand the waste and recycling system and don't contaminate recycling streams.	
Is there adequate access for collection vehicles?		If no access, ensure that provisions are made to avoid littering or blocking access to your building or to the public.	
Is your waste collection and handling impacting on your neighbours, e.g. blocking roads or creating litter, noise?		Work with contractors and cleaners to identify remedial measures.	
Is there an odour problem?		Work with contractors and cleaners to identify remedial measures. If a large amount of organic waste is stored, investigate different container options or more frequent collections.	
Is there a moderate to significant litter problem in this area?			
Waste records			
Is the approved cleaning and waste contract specification available for view?			
Are waste streams being measured and recorded in volumes and weights?		Work with contractors to implement weight-based reporting.	
Are weekly/monthly waste records available?			
Is weekly/monthly waste data being provided by weight? If so, is data being converted from volume or weighed? What conversion factor is being applied?			
Have all monitoring reports been received and filed?			
Have all weighbridge dockets been received and filed?			
Are all waste and recycling related management requirements as set out in the contract being adequately addressed?			

Other observations:

Performance conclusion		
Total wet/putrescible waste removed from floors/area (average amount/floor) kg	Total recyclable waste streams removed from floors/area: (average/floor) Paper/cardboard kg Co-mingled kg	Total diversion from landfill: _____ % of total waste _____ (kg)
Does the evidence suggest the Waste and Recycling Action Plan and/or waste contract provisions are effective? Explain.		

List key remedial/corrective actions required:

Action #	
Action #	
Action #	
Action #	
Action #	
Action #	
Action #	

End of audit

Base building waste and recycling form

Item	*Describe collection receptacle* *e.g. 120 L MBG*	*Material handling* *(container, tenant or cleaner handles)*	*Management option* *(e.g. sent to recycling or disposal)*	*Contractor details*	*Disposal/recycling facility details*	*Amount tonnage:* *kg/month or tonnes/year*	*Material tracking proof or evidence:* *documents, third party verification?*	*Action required*
❑ Paper		e.g. paper transferred in 240 L MBG	Collected in 240 L MGB for recycling					
❑ Cardboard								
❑ Mixed paper/ cardboard/ magazines								
❑ Co-mingled containers (describe items accepted)							e.g. receipts and facility sorting efficiency estimated provided	Investigate reporting of data
❑ Co-mingled containers with paper (describe items accepted)								
❑ Secure paper			e.g. destruction and recycling	e.g. tenant's contractor details	e.g. tenant contactor			
❑ Organic (e.g. food waste and garden)								
❑ Toner cartridges								Identify number of tenants with their own service. Look for opportunities for base building contract to reduce transport impacts.
❑ Mobile phones								Set up mobile muster collection program (www.mobilemuster.com.au)
❑ Batteries								

Item	*Describe collection receptacle e.g. 120 L MBG*	*Material handling (container, tenant or cleaner handles)*	*Management option (e.g. sent to recycling or disposal)*	*Contractor details*	*Disposal/recycling facility details*	*Amount tonnage: kg/month or tonnes/year*	*Material tracking proof or evidence: documents, third party verification?*	*Action required*
❑ Fluorescent lamps and compact fluorescents								Designate storage area for used lamps and arrange for recycler to collect
❑ Electronic waste (e.g. computers, printer etc., televisions								Investigate reuse opportunities with charities
❑ Furniture								Investigate reuse opportunities with charities
❑ Other								
❑ General waste								
❑ Wet waste								
❑ Dry waste								
Retail:								
❑ Cardboard								
❑ Paper								
❑ Plastic wrap								
❑ Glass								
❑ Aluminium cans								
❑ Steel cans								
❑ Plastic containers: list plastic types collected (PET, HDPE, etc.)								
❑ Co-mingled containers: list materials collected (e.g. glass, plastic, cans)								
❑ Plastic strapping								

Item	*Describe collection receptacle e.g. 120 L MBG*	*Material handling (container, tenant or cleaner handles)*	*Management option (e.g. sent to recycling or disposal)*	*Contractor details*	*Disposal/recycling facility details*	*Amount tonnage: kg/month or tonnes/year*	*Material tracking proof or evidence: documents, third party verification?*	*Action required*
❑ Coat hangers								
❑ Waste oil								
❑ Grease trap								
❑ Organic (food and garden)								
❑ Other:								

Worksheet 3.7B

Waste and recycling action plan

This is an example only – adapt this worksheet to suit your organisation's requirements, and review your plan on an annual basis.

Property name:		
Address:		
NLA or GLA of building (m^2):		
Date:	Prepared by:	Approved by:
Key contractors for the following services:		
Cleaning:	Specialist recycling contractors:	
Waste removal:	Liquids (e.g. waste oil):	
General recycling contractors:	Fluorescent lamps:	
Organics (e.g. food waste):	Other (e.g. toner cartridges, batteries, mobile phones):	
NABERS Waste rating:		

Waste generation targets for financial year

Waste stream *(adapt this for your waste stream)*	Monthly target (kg or tonnes)	Annual target (kg or tonnes)	Contamination % [1]	Method of disposal and contractor
Putrescible waste				
Paper (unsecure)				
Paper (secure)				
Cardboard				
Co-mingled plastics				
Green waste				
Food waste				
Cooking oils				
Other:				

[1] Contamination % subject to confirmation by Waste Collection Contractor

Short-term opportunities

(Actions with a payback of typically less than 3 years)

	Actions or initiatives to be taken to achieve targets or reduce waste generation, contamination levels etc.	Responsibility	Expected waste savings (kg)	Cost to implement	Payback period or internal rate of return	Time required to implement	Planned completion date	Actual completion date
	Cleaning and waste contracts and waste records							
	Tenancy waste facilities							
	Transfer of waste and recycling to base building handling areas							
	Waste and recycling handling areas/compound							

Summary for short-term opportunities

Total waste savings (kg):
Total recycling achieved (kg)
Total recycling as percentage of total waste generated (%)
Total cost savings as a % of total cost

Sign: Sign:

Date: Date:

Medium-term opportunities

(Actions with a payback of typically between 3 to 5 years, often with other benefits too.)

	Actions or initiatives to be taken to achieve targets or reduce waste generation, contamination levels etc.	Responsibility	Expected waste savings (kg)	Cost to implement	Payback period or internal rate of return	Time required to implement	Planned completion date	Actual completion date
	Cleaning and waste contracts and waste records							
	Tenancy waste facilities							
	Transfer of waste and recycling to base building handling areas							
	Waste and recycling handling areas/compound							

	Actions or initiatives to be taken to achieve targets or reduce waste generation, contamination levels etc.	Responsibility	Expected waste savings (kg)	Cost to implement	Payback period or internal rate of return	Time required to implement	Planned completion date	Actual completion date

Summary for medium-term opportunities

Total waste savings (kg):					
Total recycling achieved (kg)					
Total recycling as percentage of total waste generated (%)		Sign:		Sign:	
Total cost savings as a % of total cost		Date:		Date:	

Long-term opportunities

(Actions with a payback of typically more than 5 years, but with other significant benefits too such as improved maintenance and conditions.)

	Actions or initiatives to be taken to achieve targets or reduce waste generation, contamination levels etc.	Responsibility	Expected waste savings (kg)	Cost to implement	Payback period or internal rate of return	Time required to implement	Planned completion date	Actual completion date
	Cleaning and waste contracts and waste records							
	Tenancy waste facilities							
	Transfer of waste and recycling to base building handling areas							

	Actions or initiatives to be taken to achieve targets or reduce waste generation, contamination levels etc.	Responsibility	Expected waste savings (kg)	Cost to implement	Payback period or internal rate of return	Time required to implement	Planned completion date	Actual completion date
	Waste and recycling handling areas/compound							

Summary for long-term opportunities

Total waste savings (kg):	
Total recycling achieved (kg)	
Total recycling as percentage of total waste generated (%)	
Total cost savings as a % of total cost	

Sign:		Sign:	
Date:		Date:	

Worksheet 3.7C

Waste collection contract checklist

A waste or recycling contract should include the following information. The contract agreement should make it clear whether any extra costs will be associated with any waste or recycling activities. This is an example only – adapt this worksheet to suit your organisation's requirements.

For further information see *Waste Reduction in Office Buildings, A Guide for Building Managers*, available at www.environment.nsw.gov.au/sustainbus/wastereductioninofficebuildings.htm

Provision of service

Scope of the service required, including container sizes (garbage and recycling) and frequency of collection and service level and fees associated with each. Fees may be charged for containers considered over-full.

Recycling assurance

Where materials have been separated for recycling by the tenant or cleaners, the service provider will make all reasonable efforts to ensure the material is recycled according to its highest resource use.

Contamination penalty

The client agrees to pay a penalty clause for contamination in the recycling containers on a condition that the service provider can provide documented evidence of continual contamination above agreed levels. Agreed levels should be stated in the contract and in part related to maximum levels accepted by the receiver of the recycling material e.g. the re-processor. This penalty will allow the client to enforce improved practices by tenants or cleaners.

Flexibility

The client reserves the right to review the number and size of containers for waste and recycling every 3 months. The service fee will be altered to reflect the change of service according to agreed costs. This will allow alteration of the proportion of garbage to recycling containers should recycling rates increase or decrease.

Collection times

All waste and recycling will be collected between the hours of [9 pm] and [6 am]. Client to determine collection times that suit building occupancy patterns.

Non-scheduled pick-ups

The service provider should make non-scheduled collections of waste and recycling as requested by the client based on an agreed schedule of fees.

Collection point

The client will be responsible for placing the waste and recycling bins at an agreed collection point. Note the likelihood of an additional fee for the waste contractor to enter the building (e.g. loading dock area) or to travel an excessive distance from the truck to container.

Maintenance

Identify cost of repairs to containers where damage is caused by the client (or cleaners). Identify who is responsible to clean waste and recycling containers.

Bin stickers

Waste contractor to ensure all waste and recycling containers are appropriately and clearly labelled included labelling on lids, front side and rear.

Reporting

Monthly reports to the client on quantity of each waste and recycling stream collected in tonnes. Frequent reports on the composition of the recycling stream should also be provided.

Worksheet 3.7D

Clauses for cleaning, waste and recycling contracts

The following inserts may be suitable for inclusion in new cleaning, waste and recycling contracts tendered for office properties. This has been adapted from the original text by Colonial First State Global Asset Management. This is an example only – adapt this worksheet to suit your organisation's requirements.

Conditions of tendering

Performance objectives

Include as an additional objective: 'A reduced impact on the environment through a commitment to sustainability and environmentally sound systems of resource recovery.'

Performance benchmarks

Include the following KPIs:

Key performance indicator	Performance level	Measurement/comments	Source of data
Regulatory compliance	100%	No formal infringement or penalties associated with any relevant environmental or safety regulation, by-law etc.	Contractor and/or subcontractor
Verification of recycling	95%	Provision of accurate and comprehensive information on building recycling performance on at least a monthly basis.	Waste Contractor receipts, weighbridge receipts, Contractor records.
Principal's audits	No significant non-compliance	Minor non-compliances rectified within 5 days.	Audit report

Terms and conditions

1.0 Statutory obligations and safety and environmental compliance

The Contractor shall, in the execution and performance of the service required by this agreement, comply with all statutes, regulations, ordinances, by-laws and requirements of all competent authorities which relate to or affect the service.

The Contractor shall take all reasonable and proper safety and environmental precautions to prevent death or injury to any person or damage to any property in or near the property. In particular, all equipment and cleaning materials used by the Contractor shall be used in a manner and maintained and stored so as to prevent unauthorised use or misuse thereof and to minimise the danger of accident, spills, injury or loss arising from the use of such items.

1.1 Preparation of Environmental Management Plan

The Contractor must have an Environmental Management Plan that complies with ISO 14001:2004 and that details the impact of its service delivery on the environment and measures to improve environmental performance and management.

A draft of the Contractor's Environmental Management Plan must be submitted at least 1 month prior to the Services Commencement Date.

The Landlord may direct that the Contractor make any amendments to the Environmental Management Plan that it considers appropriate. However, non supply of comments does not relieve the Contractor of the responsibility for the Environmental Management Plan and its implementation.

1.2 Review of Environmental Management Plan

The Contractor must review the Environmental Management Plan annually and advise when the review has taken place. Any amendments to the plan must be submitted and any such review must be to the satisfaction of the Landlord.

2.0 Storage

The landlord will provide a dedicated area within the property for temporary storage of segregated waste materials for collection by the waste removal contractor/subcontractor. The contractor is to confirm that the waste handling area is, and remains, of sufficient size and location to enable effective removal of recyclable and residual waste from the subject property.

3.0 Specifications for mobile bins

Unless otherwise agreed with the Landlord, mobile bins used in the performance of services must conform to the following specifications:

- comply with AS 4123: 2006 *Mobile waste containers*
- be coloured coded as detailed in the particular service specification
- contain a minimum of 30% post-consumer recycled Australian content
- where reasonably possible, be made in Australia
- be hot stamped with individual identification serial numbers
- be labelled with high quality stickers to identify materials, using the standard signs and symbols recommended by the Department of Environment and Climate Change NSW, and
- may contain bar coding, embedded passive chip systems or RFID where these devices are used by the Contractor to improve collection service, for data gathering, monitoring and reporting.

The Contractor must retrieve all damaged bins, or bins no longer required, at any location and either:

- recycle them where it is practicable
- dispose of them where a practicable recycling option is not available, if they are damaged beyond repair, or
- repair them and store them at the Contractor's depot for re-issue to locations as required.

3.0 Cleaning materials

The Contractor shall submit details of all cleaning and polishing materials and equipment intended to be used in the performance of the work. Those details shall include Material Safety Data Sheets indicating environmental and safety precautions and the toxicity of the materials.

Where the properties of cleaning materials reduce the impact on the environment and risk of adverse health effects, such as low toxicity cleaning chemicals or cleaning cloths that do not require chemicals, these are to be offered over the conventional materials. Such a provision should be highlighted in the submission for consideration as it is appreciated this may impact on the price for the supply of the materials.

4.0 Emission management system for diesel vehicles

The Contractor must introduce an emission management system that complies with the standards of the Clean Fleet™ Program for Diesel Vehicle Maintenance for all collection vehicles that are diesel vehicles. Within 6 months of the Services Commencement Date, the Contractor should become a member of the Clean Fleet™ Program for Diesel Vehicle Maintenance and pay any associated costs including for periodic audits.

Scope of work (property requirements)

Waste management and recycling

A comprehensive waste management and recycling program using an approved recycling contractor will constitute a major part of this contract.

Waste removal performance objectives

- To maintain an appropriate size and frequency of service applicable to the recycling activity within the property in a cost-effective manner.
- To collect, remove and dispose of all wastes in accordance with relevant State environmental legislation
- To ensure all recyclable wastes including paper, cardboard, co-mingled containers and wet wastes (if applicable) are removed to a proper recycling or reprocessing facility, and
- To ensure all waste activity is quantified (by weight) and outcomes verified for reporting back to building management.

Waste handling generally

Waste material (recyclable and putrescible) collected from tenants' floors shall be by lightweight, leak-proof, collapsible trolleys. Contractors will ensure that the corners of these trolleys are suitably protected to prevent damage to office furniture and equipment and to walls within the building. The contractor shall only use the goods lift for wet and recycling material removal. This lift [if applicable] will be available for this purpose between the hours of [1800 to 0600 the following morning].

Putrescible waste and the recyclable wastes are to be collected in separate colour-coded bags and placed in the bins located in the [basement/ground floor loading dock] for collection by the responsible contractors. Black bags are to be used for putrescible waste only. If

supplied, the waste contractor's container (e.g. skip, compactor), or similar equipment provided by the Landlord, will be used to store the wastes.

The Contractor is to ensure all waste storage facilities have adequate and appropriate signage to ensure no contamination of waste containers by inappropriate wastes. The Contractor is also to ensure that tenants do not contaminate the waste containers or leave materials or prevent proper working of the waste containers. The Contractor is to ensure the waste contractor has adequate access to the waste containers for removal and delivery.

The Contractor is to advise the building manager immediately where hazardous or toxic materials have or are likely to have been disposed of in the waste system.

The Contractor is to advise building management where opportunities arise or are identified to improve the recycling system and further divert wastes from landfill.

Wet/putrescible waste removal responsibilities

The Contractor is responsible for:

- delivery of wet waste to a waste collection point on a daily basis as described in the cleaning scope of works
- safe removal of tenant waste from the property, including redundant chemicals used for cleaning services
- supplying and maintaining appropriately sized waste bins serviced at optimum frequency as applicable to the property and the generation of waste
- ensuring signage on tenant waste bins (if provided), particularly in office hubs or similar central bin locations, is easily visible and appropriately located to facilitate waste disposal by building occupants
- where directed by the building manager, installation and maintenance of an odour desensitising system, or similar, in the basement or central waste handling area
- ensuring waste is not stored on the premises for an unnecessary period of time so as to lead to odour, vermin problems or complaints by tenants
- removal of all waste from the property to a licensed waste facility
- collecting and reporting to the building manager waste performance on a monthly basis and maintaining records as necessary to verify performance (by weight only of material removed)
- assisting the building manager as necessary and providing all information required during the course of waste performance reviews or activity audits, and
- making recommendations to and assisting the building manager in efforts to increase tenant awareness of waste avoidance or minimisation.

Recycling service performance responsibilities

The Contractor shall be responsible for:

- day-to-day operation of recycling systems in a way that maximises recycling efficiencies
- provision of adequately sized, located and signed recycling containers within tenant floors and in the central waste handling area in the [basement/ground floor loading dock]

- the use of a colour-coded bag system to allow differentiation of recyclable materials from generation point to the recycling collection point
- periodically assessing the contamination rates of material disposed of in the recyclable containers/bins and advising the building manager if contamination is likely to be significant or put at risk the collection of recycled material by the recycling contractor
- delivery of recycling material to recycling collection points on a basis as described in the cleaning scope of works
- ensuring all recycling material collected and removed from the building is sent to the appropriate recycling facility for reprocessing of these materials
- collecting and reporting to the building manager recycling performance on a monthly basis and maintaining records as necessary to verify recycling performance (by weight only of material in each recycling stream removed)
- assisting the building manager as necessary and providing all information required during the course of waste performance reviews or activity audits, and
- making recommendations to and assisting the building manager in efforts to increase tenant awareness of recycling and improved recycling results.

Education

The Contractor must actively participate in the education and training of tenants in the use of these services. This includes:

Developing and delivering pre-service and start-up education

The Contractor will nominate and provide appropriately qualified and experienced personnel to develop, implement and evaluate the pre-service and start-up education program on behalf of the building manager. The pre-service and start-up education phase will cover the period prior to the Services Commencement Date and include the first 12 months of the Contract Term.

The Contractor must purchase environmentally preferable goods where possible for the development of the pre-service and start-up education. Printed materials should be produced in an environmentally sensitive manner and must contain a minimum of 50% recycled fibre and be manufactured using cleaner production printing practices, including but not limited to, use of vegetable-based inks and manufacture without the use of bleaches containing chlorine.

Pre-service and start-up education plan

One month prior to the Services Commencement Date, the Contractor must provide a draft pre-service and start-up education plan for approval by the building manager.

At a minimum, this plan must include:

- ultimate and immediate outcomes of the plan
- design and production of bin stickers
- design and production of pre-service information flyers
- tenant information packages
- other initiatives to assist tenants to correctly use the Services
- proposed environmentally preferable goods to be purchased

- detailed timeline and responsibilities for activities
- details on how the plan will be evaluated including useful, feasible key performance indicators for the ultimate and immediate outcomes, and
- ongoing education for tenants on at least an annual basis.

The pre-service and start-up education plan must be approved by the building manager prior to implementation. The Building Manager reserves the right to make amendments or additions to the education plan prior to final approval.

Ongoing education

Annual education plan

Two months prior to each anniversary of the Contract Commencement Date, the Contractor will prepare and submit for approval, a detailed annual education plan for the following year of the Contract. This will include:

- ultimate and immediate outcomes of the plan
- groups that the plan will target
- strategies to be used to target each group
- new resources to be developed
- reprinting of existing resource materials
- proposed environmentally preferable goods to be purchased
- details of how the plan will complement or enhance other contractual obligations such as contamination management and reporting recycling performance back to users on a quarterly basis
- specific timeframes and responsibilities for carrying out tasks
- reporting timeline and methods
- details on how the plan will be evaluated including useful, feasible key performance indicators for the ultimate and immediate outcomes, and
- methods of ensuring that customers understand the importance of:
  - – separated waste streams
  - – end-markets for recyclables
  - – outcomes of recycling by material types, and
  - – minimising waste.

The annual education plan must be approved by the building manager prior to implementation.

Reporting

The Contractor must provide reports on a quarterly basis as per Section XXX and as required by [specific agencies]. The reporting should be in accordance with NSW Government Policy and the Contractor's compliance with that policy.

The Contractor must report waste and recycling flows on a monthly basis and maintain records as necessary to verify recycling performance (by weight only of material removed). Where data is collected in volume then the conversion factor used must also be disclosed.

The Contractor must report composition of the co-mingled recycling streams on a 6-monthly basis via an accredited third-party verified audit. This must be a percentage figure (%) of the different recyclables collected.

The Contractor must verify the sorting efficiency of any off-site separation of co-mingled recyclable material. The ‘sorting rate’ of the Sorting Facility must be provided via an accredited third-party verified audit. This must be a percentage figure (%) of the recycling and re-use materials collected from a particular building.

Managing indoor environment quality

3.8

Context

Managing indoor environment quality (IEQ) is an essential component of the sustainability plan for any commercial property. The quality of the environment created within a building is fundamental to its occupants' health and wellbeing. This is particularly true for commercial property – both office and retail – where many people spend a large proportion of their working life, generally in an artificially maintained environment.

The indoor environment is influenced by:

- indoor air quality (IAQ) – ventilation standards, air change effectiveness and levels of pollutants (chemical, biological and physical)
- lighting quality – light levels, both artificial and natural, and visual comfort
- acoustic quality – noise levels
- thermal comfort – temperature, humidity and air speed
- office layout – spatial arrangements of walls, partitions, furniture and equipment in relation to fixed elements like windows and heating, ventilation and air conditioning (HVAC).

Engaging with tenants is an important part of managing indoor environment issues because responsibility is often shared between the building owner and the building occupants. You can help tenants by giving them advice about how to manage indoor environment quality and by outlining the flow-on benefits they might enjoy, such as improved workplace productivity. Increasingly, tenants are keen to avoid risks to their staff from occupying unhealthy buildings. This is putting greater pressure on building owners to introduce systems to ensure – and be able to prove – they have and can maintain a high level of indoor environment quality.

What's in this section

Drivers for managing indoor environment quality

Recently there has been significant international focus on healthy indoor environments and the links to occupant wellbeing and productivity. The 'Your Building' website (www.yourbuilding.org/display/yb/Home) presents recent IEQ research and case studies applicable to the Australian property industry.

Key drivers for tenants and building occupants

- Realise improved work performance benefits due to a pleasant and comfortable working environment.
- Realise commercial benefits from improving the productivity of individuals – for the individuals and the whole organisation.
- Reduce illness, absenteeism and building-related illness rates.
- Help attract and retain high quality staff.

Key drivers for property managers and owners

- Achieve better rental yields and retain tenants.
- Reduce tenant complaints and hence achieve operational and maintenance costs savings.
- Maximise marketing opportunities derived from improving the reputation of the property or organisation.
- Achieve high-performing buildings as recognised by the environmental rating tools.
- Reduce exposure to possible litigation and insurance costs.
- Reduce the burden of compliance in the future.

These drivers have been sourced from 'Your Building: Indoor environment, productivity and sustainable commercial buildings', Philip Paevere and Steve Brown et al, 2007. For more information visit the 'Your Building' website: www.yourbuilding.org/display/yb/Home

Steps: Managing indoor environments

1 Measure baseline performance

Gather information to establish a baseline analysis of your property. You could use the indoor environment review in Worksheet 3.8A as a guide. Some of this information can be obtained from BMCS (building management and control systems) and utility records, and other aspects will require a site inspection. This review will increase your understanding of the physical characteristics of the property that influence its indoor environment quality and help you to identify any data gaps that may need to be addressed.

Investa staff benefit from healthier office fitout

'Investa prides itself on the quality of office accommodation it provides to tenants and has 'walked the talk' in its own office accommodation at 126 Philip Street Sydney. In addition to the fitout's strong performance on energy – 30% more energy efficient than the level required to achieve a 5-star tenancy rating under NABERS Energy – it has been rewarded a 5-Star Green Star Office Interiors rating in recognition of broader sustainability credentials, including healthier indoor environment quality. Innovative features incorporated into the fitout include:

- Outside air supply volumes have been increased to 50% more than a typical office to give people fresher air (using the supplementary supply normally dedicated to meeting rooms).
- None of the paints used emit harmful fumes – nor will they off gas harmful volatile organic compounds (VOCs) into the work environment.
- There are no toxic chemicals in any of the joinery substrates.
- There is a specially selected pot plant for every person in the office to help filter the air.

In February 2008, an Office Environment Satisfaction Survey was undertaken among Investa office staff at 126 Phillip Street by Bond University in association with the Green Building Council of Australia to explore the impact of the 'green' initiatives. The survey revealed a high level of satisfaction with the office environment overall. Of the 64 respondents, the following percentages of staff agreed with these comments:

- 84% – "I have a positive opinion about my workplace."
- 80% – "My physical office environment has a positive impact on my job satisfaction."
- 94% – "Working in a Green Office makes me feel that my organisation has genuine concerns about the wellbeing of its employees"'

(See photo page 3.)

Investa Property Group

Implement measures that will help you to better understand the risk factors in base building operation. Make sure these factors are included in regular building inspections.

2 Benchmark and set performance targets

Use the NABERS Indoor Environment rating system to benchmark your building's performance and set performance targets for your indoor environment. Establish a measuring and monitoring regime to support your performance reporting (see www.nabers.com.au).

NABERS Indoor Environment has been designed to reflect the sharing of responsibility for indoor environment quality between owner and occupant. By making this information available and working with your tenants you could add value to the tenancy relationship.

What does NABERS Indoor Environment involve?

NABERS Indoor Environment assesses five environmental measures: air quality, acoustic comfort, lighting, office layout and thermal comfort. Which measure is assessed for each rating type (Base Building, Whole Building or Tenancy) reflects the ability to control the measure. For example, thermal comfort is not assessed for Tenancy ratings as this measure is not generally controlled by the tenant.

NABERS Indoor Environment involves direct physical measurements of a range of indoor pollutants, sound levels, temperature, relative humidity, air speed and lighting levels. For NABERS Indoor Environment Tenancy and Whole Building ratings the assessment includes an occupant satisfaction survey to provide an indication of satisfaction with various aspects of the indoor environment that cannot be fully assessed through direct physical measurements (refer to Worksheet 3.8D for more information). An occupant satisfaction survey is not required for Base Building ratings.

Self assessment for your building?

You can self-assess the environmental performance of the base building at no cost using the NABERS self assessment calculator (see www.nabers.com.au). This involves collecting temperature, relative humidity and air speed data, measuring Particulate (PM_{10}), airborne microbial and carbon dioxide levels and recording the base building sound levels to assess how well the building removes external noise and how noisy or silent base building services are (e.g. air conditioning). Most building management systems are designed to record temperature, relative humidity and air speed data, but may need to be set up to retain this information over a longer time period.

Investa's fitout at 126 Philip Street Sydney

NABERS

About NABERS

NABERS is the National Australian Built Environment Rating System managed by the Department of Environment and Climate Change NSW. NABERS is a performance-based rating system which measures the operational environmental impacts of existing buildings.

NABERS office tools can be applied to three distinct situations:

- **Tenancy** ratings that cover the space occupied by a single tenant and under the control of that tenant
- **Base Building** ratings that cover all office spaces for that building, and measure the parameters that are under the control of the landlord or base building
- **Whole Building** ratings that are a combination of both Tenancy and Base Building for the situation where a tenant is the owner and/or has control of all services.

For more information see www.nabers.com.au

Under NABERS, a higher score is awarded where there is a 12- month period of continuous temperature, relative humidity and air speed data.

Accredited assessment

To use the NABERS Indoor Environment Base Building rating to promote your property, or to undertake a NABERS Indoor Environment Whole Building or Tenancy rating to promote your organisation, or to use the NABERS trademarks, you must obtain a rating from a NABERS Accredited Assessor. Employ an assessor with good knowledge of sustainability practices in both commercial property design and management. A list of assessors is available at www.nabers.com.au

3 Develop an indoor environment action plan

Once you have established a baseline and performance targets for your building, develop an action plan for managing indoor environment issues and implementing improvement initiatives.

Use a simple risk assessment exercise to prioritise the actions. This is particularly important where real or perceived risks may be high, such as in situations where there is a history of tenant complaints or where pollutant concentrations are more likely to be high (e.g. poorly ventilated car parks).

Work out what remedial measures need to be undertaken, and when. For example, does the risk mean that measures should be undertaken:

- immediately e.g. to address occupational health and safety issues
- as part of ongoing building maintenance, or
- as part of refurbishment activities, and perhaps requiring collaboration with tenants.

The action plan should also identify responsibilities. Where issues are primarily a tenant responsibility, the plan needs to nominate a strategy for working with the tenant to raise their awareness of the issues and identify remedial measures.

Worksheet 3.8B details some mitigation measures to improve air quality. For in-depth advice and technical detail on this subject refer to *Indoor Air Quality, Mechanical Engineering Services Application Manual No. DA 26,* Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH), www.airah.org.au

Make sure indoor environment improvements are included in scheduled cyclic maintenance or capital upgrades and in the building's operational budgets.

New thinking about thermal comfort

'Thermal comfort of building occupants is determined by air temperature, mean radiant temperature, air speed, relative humidity and expectation. Then there are two personal parameters – clothing (insulation) and activity level (body heat).

In office buildings the most common thermal discomfort is people being too cold in summer. This is often the result of a mismatch between clothing levels (selected for variable outdoor weather) and a constant air conditioned indoor temperature.

Predicted Mean Vote (PMV) is an index which represents the average comfort level experienced by a large group of people exposed to the environment in question. A related index is the Predicted Percentage Dissatisfied (PPD) which, as the name suggests, estimates what proportion of the occupants in a given environment will be dissatisfied due to thermal factors. The PMV/PPD indices aim to achieve a high level of thermal comfort in a fully sealed, air conditioned building.

In 2004, The American Society of Heating, Refrigeration and Air Conditioning Engineers, in ASHRAE Standard 55-2004, adopted the ADAPTIVE model of thermal comfort for mixed mode and naturally ventilated buildings. In 2007 the Europeans followed suit with Standard EN 15251. Occupants of such environments are generally more tolerant of thermal discomfort and can take some actions such as opening or closing a window in order to restore comfort to their indoor environment. This represented a fundamental shift in thinking about how to achieve comfort in commercial buildings. Older models such as PMV/PPD ignored completely the myriad factors contributing to a building occupant's comfort expectations.'

Assoc. Prof. Richard de Dear,
Division of Environmental and Life Sciences,
Macquarie University, Sydney

Keep abreast of local and international research and information available through industry associations. Wherever practical, apply this knowledge to improving the quality of your property's indoor environment.

4 Check building services and management control systems are running effectively

Make sure all building services are functioning to the required specifications and meeting the needs of the building occupants. For example, are temperature settings based on predicted occupant use? Make sure building records include up to date information on:

- HVAC equipment
- modifications to the building that might impact on HVAC functions
- information about chemicals stored and their storage requirements.

5 Review maintenance procedures

A good preventive maintenance program is probably the most effective management tool for preventing problems. Consult building services specialists to confirm preventive maintenance practices and make sure subcontracting arrangements are achieving the best results. Check that maintenance procedures effectively cover:

- **Air and water systems** – understand and implement the best practice requirements set out in *AS/NZS 3666.2: Air handling and water systems of buildings – Microbial control – Operation and maintenance* (see Standards Australia SAI GLOBAL webshop, www.saiglobal.com/shop/Script/search.asp).
- **Cleaning procedures** – use cleaning procedures to help reduce the presence of indoor pollutants such as mould and dust. Make sure cleaners use only low toxicity cleaning agents (e.g. natural, solvent-free and hydrocarbon-free cleaning products) and store chemicals safety. Check that cleaning staff are adequately trained in awareness of indoor environment issues and what they need to do to reduce risks.
- **Storage of chemicals** – check that chemicals, including cleaning products and pesticides, are stored in such a way that they do not impact on indoor environment quality.
- **Maintenance and repair activities –** where possible make sure that paints, adhesives and sealants used for repair and maintenance jobs have low levels of volatile organic compounds (VOCs), e.g. water-based glues and natural paints. Make sure all maintenance contractors are aware of your requirements.

Measures of indoor environment quality

'The Green Building Council of Australia's *Technical Manual for Green Star Office Design & Office As Built* Version 3, 2008 – Section: Indoor Environment Quality – contains the following measures (with explanations):

- ventilation rates
- air change effectiveness
- carbon dioxide monitoring & control
- daylight
- daylight glare control
- high frequency ballasts
- electric lighting levels
- external views
- thermal comfort & control
- hazardous materials
- internal noise levels
- volatile organic compounds
- formaldehyde minimisation
- mould prevention
- tenant exhaust riser.'

Green Building Council of Australia
www.gbca.org.au

6 Develop a sustainable refurbishment strategy

Many indoor environment risks can be mitigated through careful design and choice of materials. Refurbishments and upgrades provide the opportunity to use healthier alternatives to high-risk building materials, finishes and furnishings.

Design attributes that improve IEQ

The Green Building Council of Australia's Green Star rating system allocates credit points for building attributes that improve or help reduce impacts on indoor environment quality, including maximising daylight and reducing glare. The Green Star Interiors tool can be used to guide design and material choices – see www.gbca.org.au

Product choices that improve IEQ

Good information is available about the environmental performance of many commercial building fitout materials, products and office equipment. Information can be found in sources such as:

- manufacturers' environmental fact sheets or material data sheets
- product certification schemes such as the Good Environmental Choice Label administered by the Australian Environmental Labelling Association: www.aela.org.au
- 'ecospecifier' – an online tool with information about environmentally preferable products, materials, technologies and resources: www.ecospecifier.org
- 'Sustainable Choice' – a sustainable procurement program for NSW local government that also has an online database with information about sustainable products and services: www.lgsa-plus.net.au/sustainablechoice

Post-refurbishment occupation

Make sure there is sufficient time to purge newly constructed premises before occupation. This could include repeated outside air exchange cycles in HVAC operation, washing down surfaces to remove dust, or sealing and heating premises to accelerate off gassing from building materials or finishes such as paints and glues.

Participate in post-occupancy evaluation research programs involving new or refurbished buildings or tenancies.

Worksheet 3.8C summarises design measures that can improve air quality during fitouts. See also Section 4: 'Sustainability and Project Delivery'.

7 Engage with tenants

It's extremely important to work with tenants during the design phase of any fitouts or refurbishments because many of their choices – materials, finishes, fittings, locations of printing equipment, office layout – will have significant impacts on indoor environment quality. Strategies for working with tenants include:

Regular engagement

Implement measures to regularly engage with tenants about indoor environment issues, including the operation of base building facilities and tenancy facilities.

Consider using an annual survey similar to the tenant survey included in Worksheet 3.8D. Discuss the findings with the tenants and agree on improvement actions.

Collaborate on gathering information about trends in productivity levels including sick leave, time off, workplace injuries and staff complaints.

Responding to tenant issues or complaints promptly

Make sure tenants can see you have responded to their concerns. Promptly identify the source of an issue and the actions that will be required to deal with it.

Educating tenants

Work with tenants to help them understand how they can actively contribute to improving indoor environment quality. For example,

encourage them to place indoor plants in the workplace because this can help to reduce indoor pollutants. However, make sure tenants also understand that over watering of plants could generate mould and fungi.

Encourage tenants to design and manage their fitout in accordance with the Green Building Council of Australia's Green Star Office Interiors tool (see www.gbca.org.au).

Encourage tenants to consult the *Green Lease Guide* – a good source of tips for improving a tenancy fitout (e.g. choices of materials and finishes, joinery, floor coverings, workstations etc.) and office operations (e.g. equipment choice). See www.environment.nsw.gov.au/sustainbus/greenlease.htm.

Reporting improvements

Keep tenants informed about any improvements or modifications you have initiated that will enhance their indoor environment quality, such as higher ventilation rates or upgrades to the HVAC system.

8 Establish ongoing monitoring

Make sure operational budgets include allowances for regular monitoring, particularly in higher risk situations. Use the monitoring data to show trends in indoor environment quality so this information can be used to inform management decisions.

Set up an annual testing regime, using an accredited assessor, in accordance with NABERS standards so you can benchmark your building against industry practices (see www.nabers.com.au).

9 Report performance

Review and report on indoor environment quality as part of your annual building performance review. Use public reporting, such as the NABERS program, to ensure accountability and make a positive contribution to your organisation's reputation.

CH2 – Council House 2, Melbourne

'CH2 is a 10-storey office building that houses approximately 500 City of Melbourne staff and also has some ground floor retail space. The building has a 6-star Green Star rating and has been occupied since October 2006. It incorporates a range of sustainable design philosophies and technologies including use of photovoltaic cells and wind driven turbines, active louvres, opening windows on the north and south facades, sewer mining for water recycling, night purging and chilled beams to aid air circulation and radiant cooling. Indoor environment quality design features include 100% fresh air ventilation, radiant and evaporative cooling, use of low toxicity materials and extensive use of plants.'

www.agdf.org.au/Images/ftp/Information/Projects/MelbourneCC_CH2.pdf

Further information

- NABERS, www.nabers.com.au
- Green Lease Guide, www.environment.nsw.gov.au/sustainbus/greenlease.htm
- Your Building, recent Australian research, including 'Your Building: Indoor Environment, productivity and sustainable commercial buildings', Philip Paevere, Steve Brown et al, 2007, www.yourbuilding.org/display/yb/Home

- Standards Australia, www.standards.com.au; SAI GLOBAL webshop, www.saiglobal.com/shop/Script/search.asp
- Good Environmental Choice Label, Australian Environmental Labelling Association, www.aela.org.au
- 'ecospecifier' guide to environmentally preferable products and materials, www.ecospecifier.org
- 'Sustainable Choice' sustainable procurement program for NSW local government, www.lgsa-plus.net.au/sustainablechoice
- For articles and technical papers: Australian Institute of Refrigeration Air Conditioning and Heating (AIRAH), www.airah.org.au
- *Indoor Air Quality, Mechanical Engineering Services Application Manual No. DA 26*, Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH)
- Building Code of Australia, www.abcb.org.au
- CSIRO Australia, www.csiro.au/science/psd1.html
- Clean Air Society Of Australia & New Zealand, www.casanz.org.au/
- 'Indoor Air Quality', State of the Environment Technical Paper Series, Australian Government Department of The Environment, Water, Heritage and the Arts, www.environment.gov.au/soe/1996/publications/technical/12indora.html
- 'Air Toxics and Indoor Air Quality in Australia', State of knowledge report, Environment Australia 2001, Australian Government Department of the Environment and Water Resources, www.environment.gov.au/atmosphere/airquality/publications/sok/index.html
- *ESD Design Guide for Australian Government Offices* (Edition 2), (former) Commonwealth Department of Environment and Heritage, 2006
- ESD Case Study: 'Council House 2, Melbourne, Victoria', www.agdf.org.au/Images/ftp/Information/Projects/MelbourneCC_CH2.pdf
- 'Indoor Environment Quality and Occupant Productivity in the CH2 Building': Post Occupant Summary Report #USP2007/23, Philip Paevre & Stephen Brown, CSIRO Highett, Victoria, 2008
- *Exposure Standards for Atmospheric Contaminants in Occupational Environment*, National Health and Medical Research Council, Australian Government Publishing Service, 1995
- *Green Star Office Design & Office As Built Technical Manual*, Version 3, 2008, Green Building Council of Australia, www.gbca.org.au
- National Occupational Health and Safety Commission, www.nohsc.gov.au
- 'Indoor Air Quality in Large Buildings', US EPA, www.epa.gov/iaq/largebldgs/index.html
- EcoLibrium, 'How well do we understand thermal comfort?', December 2007, www.airah.org.au
- American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), www.ashrae.org
- ASHRAE Standard *55-2004, Thermal Environmental Conditions for Human Occupancy*

Worksheets

Review and use these Word documents:

3.8A Indoor environment review

3.8B Indoor pollutant sources and tips on mitigation

3.8C Indoor air quality considerations during fitouts

3.8D Tenant survey: indoor environment quality

Worksheet 3.8A

Indoor environment review

Use this review to identify issues and the measures that can be carried out to improve indoor environment quality. For benchmarking indoor environment quality use NABERS methodology (see www.nabers.com.au). This is an example only – adapt this worksheet to suit your organisation's requirements.

Property:		
Address:		
Tenant:		
Prepared by:		Date:
Approved by:		Date:

	Whole building	Actions required/ responsibility
Overall:		
Is there a tenant complaints register that includes indoor environment issues?		
Have tenant issues been satisfactorily resolved?		
Has an occupant satisfaction survey been undertaken?		
What remedial measures are in place as a result of the survey? (and when will they be carried out)		
• immediately		
• during ongoing maintenance		
• as part of refurbishment		
Has a NABERS Indoor Environment rating been undertaken?		
• Was it a self-assessment or accredited assessment?		
List all common areas in the building, e.g. foyers, lifts, stairwells, carpark, outdoor areas		

	Tenanted areas	Base building	Actions required/ responsibility
1 Thermal comfort			
Does the building management control system (BMCS) record:			
• space temperatures?			
• relative humidity?			
• outdoor temperatures?			
Is the BMCS system providing appropriate space temperatures and relative humidity?			
Have spot readings for the above also been taken?			
Have there been any tenant complaints about thermal comfort in common areas or in tenancies?			
What modifications have been made to the building or tenancies that may impact on the HVAC system?			
2 Air quality			
Is the BMCS providing optimum air quality and ventilation rates?			
Have there been any tenant complaints about air quality in common areas or in tenancies?			
Has testing been undertaken for:			
• carbon dioxide			
• carbon monoxide			
• particulate matter			
• airborne microbials			
• –formaldehyde			
• total volatile organic compounds (VOCs)			
Have possible and actual sources of indoor air pollutants been identified?			
What remedial measures can be undertaken? (and when)			
• immediately (safety issues)			
• during ongoing maintenance			
• as part of refurbishment			

	Tenanted areas	Base building	Actions required/ responsibility
Are procedures in place to encourage, or require, new tenancy fitouts to minimise the introduction of pollutants during fitout and in the ongoing management of premises?			
3 Lighting			
Have there been any tenant complaints about lighting in common areas or tenanted areas?			
Have luminance levels been assessed in the tenanted office spaces?			
What remedial measures can be undertaken? (and when)			
• immediately (safety issues)			
• during ongoing maintenance			
• as part of refurbishment			
4 Acoustic comfort			
Have there been any tenant complaints about noise in common areas or in tenanted areas?			
Have the ambient sound levels been measured in the tenanted office spaces?			
What remedial measures can be undertaken? (and when)			
• immediately (safety issues)			
• during ongoing maintenance			
• as part of refurbishment			
5 Office layout			
Are procedures in place for working with tenants to raise awareness of indoor environment issues?			
Has consideration been given to optimising:			
• air quality and ventilation			
• access to natural light			
• minimal noise			
• privacy			
• lighting, including task lighting			
• temperature			
• workstation design			

	Tenanted areas	Base building	Actions required/ responsibility
Are procedures in place to make sure new tenancy fitouts do not compromise air or water handling systems?			

Worksheet 3.8B

Indoor pollutant sources and tips on mitigation

Category/common sources	Tips for mitigation and control
Housekeeping and maintenance	
cleaning products waxes and polishes disinfectants 'air fresheners' adhesives cleaners' cupboards storage cupboards wet mops drain cleaners vacuuming paints and coatings solvents pesticides lubricants	• Use low-emission products • Avoid aerosols and sprays • Dilute to proper strength (manufacturer's instructions) • Do not overuse • Use during unoccupied hours • Use proper protocol when diluting and mixing • Store properly with containers closed and lid tight • Use exhaust ventilation for storage spaces (eliminate return air) • Clean mops: store mop top up to dry • Avoid 'air fresheners' – clean and exhaust instead • Use high-efficiency vacuum bags and filters • Use integrated pest management • Record all materials stored and used
Occupant-related sources	
tobacco products office equipment: printers photocopiers ovens or microwaves art supplies marking pens paper products personal products (e.g., perfume) tracked in dirt or pollen	• Enforce non-smoking policy • Use exhaust ventilation with pressure control for major local sources • Use low-emission art supplies and marking pens • Avoid paper clutter • Provide educational material for occupants and staff

Category/common sources	Tips for mitigation and control
Building uses as major sources	
print and photocopy shop dry-cleaning science laboratory medical office hair or nail salon cafeteria pet store	• Use exhaust ventilation and pressure control • Use exhaust hoods where appropriate; check hood airflows
Building-related sources	
plywood or compressed wood construction adhesives asbestos products insulation wall and floor coverings (vinyl or plastic) carpets and carpet adhesives wet building products transformers upholstered furniture renovation and remodelling	If materials that will offgas will be used, e.g. those containing VOCs or formaldehydes: • Use low-emission products • Air out in an open or well ventilated area before installing • Increase ventilation rates during and after installation • Keep material dry before enclosing • Apply an appropriate sealant • Follow renovation guidelines
HVAC systems	
contaminated filters contaminated duct lining dirty drain trays humidifiers lubricants refrigerants mechanical rooms cooling towers maintenance activities combustion appliances boilers and furnaces hot water systems generators stoves	• Perform HVAC preventive maintenance in accordance with AS/NZS 3666.2 • Check filter change protocols • Clean drain trays; check slope and drainage • Use potable water for steam humidification • Keep duct lining dry; move lining outside duct if possible • Fix leaks and clean spills (see filter change protocol) • Maintain spotless mechanical room (not a storage area) • Avoid back drafting • Check and maintain flues from boilers to outside • Keep combustion appliances properly tuned • Disallow unvented combustion appliances • Perform polluting activities during unoccupied hours

Category/common sources	Tips for mitigation and control
Moisture	
Mould	• Keep building dry • Review mould and moisture control protocols
Vehicles	
Underground or attached carpark	• Use exhaust ventilation • Maintain carpark under negative pressure relative to the building • Check air flow patterns frequently • Monitor carbon monoxide

Source: US Environmental Protection Agency: www.epa.gov/iaq

Worksheet 3.8C

Indoor air quality considerations during fitouts

Component	Factors to control	Design/management options
From outside the building		
Climate	Air temperature and humidity	Optimise ventilation
Outside air ventilation and infiltration	Intake air quality	Select location of intake to reduce non-designed air entry
Infiltration of water	Unwanted moisture entry	Design and maintain waterproof construction; ensure moisture does not form in heating, ventilation and air conditioning (HVAC) systems
From the building and HVAC systems		
Building design	Natural or mechanical ventilation	Building depth, location and orientation
Adhesives and sealants	Solvent emissions	Chose low-emission products
Glass	Lamination inter-layers and coatings	Impact on indoor air quality (IAQ) unknown as yet
Metals	Pre-painting	Impact on IAQ unknown as yet
Termite control	Chemicals	Use mechanical over chemical controls
Timber preservation	Use of toxic chemicals	Avoid where possible; use durable timbers
Brick and block	Natural radioactivity	Found to be low in a range of products
Timber framing	Volatiles affecting sensitive individuals	Impact on IAQ unknown as yet
Thermal insulation	Fibre and volatile organic compound (VOC) emissions	Product selection
HVAC systems	Generation, transfer and removal of air contaminants	System design and maintenance
Interior design generally	Pollutants sources, ventilation flow	Material selection, ventilation design
Plywood/laminated veneer lumber (LVL)	Formaldehyde and VOCs	Select low-emission products
Reconstituted wood based panels/veneers	Formaldehyde and VOCs	Select low-emission products and overlay adhesives
Plastic laminates	VOCs	Select low-emission adhesives

Component	Factors to control	Design/management options
Plaster/gypsum board	Few emissions but sinks for pollutants	
Ceramic tiles	Emissions from adhesives and grouts	Select low-emission adhesives
Wallpaper	Formaldehyde and VOCs	Low-emission products; delay occupancy
Paints	Solvents and additive vapours during and after application	Low-emission products
Carpet	Odour and VOCs; accumulation of contaminants	Low-emission adhesives; cleaning methods; walk-off mats
Linoleum	VOCs from adhesives	Low-emission products
Vinyl	Long-term emissions of volatiles and plasticisers	Low-emission products
Furnishing and furniture	Formaldehyde and VOCs from components and surface treatments; dust collection	Low-emission products; avoid thick fibre coverings
Equipment and appliances	VOCs and ozone from photocopiers and printers; combustion products from gas and fuel appliances	Low-emission products; exhaust flues
Occupant activities	Smoking, cooking, hobbies, cleaning	Smoking prohibition, range hoods, cleaning regime
Pest management	Pesticide residue, indoor and outdoor	Product usage
Cleaning	VOCs from cleaning products; dust disturbance	Low emission/toxicity products; high efficiency vacuum cleaners
Interior renovation practices	Pollutant transfer through building	Isolate the area

Adapted from the CSIRO BCE Technical Report TR97/3, December 1997

Worksheet 3.8D

Tenant survey: indoor environment quality

The purpose of an occupant satisfaction survey is to provide a good indication on how indoor measures such as lighting and air quality impact on the occupants. Occupant satisfaction surveys provide useful information on occupant satisfaction that is not easily measured through direct (quantitative) measurements, for example office layout.

To avoid any survey bias, the occupant survey must be done prior to any direct measurements.

NABERS Indoor Environment – Tenancy and Whole Building Ratings

Occupant Satisfaction Survey

Introduction

The aim of the NABERS Indoor Environment rating tool is to measure the impact of a building on the environment and its occupants. The NABERS Indoor Environment tool uses a combination of direct measurement and an occupant satisfaction survey for Tenancy and Whole Building ratings. An occupant satisfaction survey is not required for Base Building ratings.

NABERS uses an occupant satisfaction survey for Tenancy and Whole Building NABERS Indoor Environment ratings to provide an indication of satisfaction with various aspects of the indoor environment that can not be fully assessed through direct (quantitative) measurements. The occupant satisfaction survey is not a health or safety survey and is more directed towards measuring comfort and satisfaction. NABERS assumes that health and safety is covered under statutory obligations.

There are two recognised NABERS occupant satisfaction survey providers with surveys that are benchmarked to best practice and can therefore provide reliable evaluation of some aspects of the indoor environment.

Instructions

To apply for a NABERS Indoor Environment Tenancy or Whole Building rating, an online occupant satisfaction must be undertaken by one of the two recognised providers. This survey must be undertaken prior to any direct measurements.

To ensure an appropriate response, the occupant survey must be available to staff for up to two weeks and as a minimum 75% of full-time staff must be surveyed, with a response rate of either 50% of distributed surveys or 40% of the total number of staff.

The two recognised NABERS providers are:

- Building Use Studies (BUS) – Usable Buildings, England
- Center for the Built Environment (CBE) – The University of California, Berkeley, USA.

The fee is approximately $1500 – $2000 per occupant satisfaction survey.

The results provided by the NABERS recognised provider are then entered into the NABERS Validation Protocol spreadsheet by an Accredited Assessor where it is combined with the direct measurements to give an overall score for each measure, e.g. air quality, lighting.

For further information on the two recognised NABERS providers contact NABERS at www.nabers.com.au

Self assessment occupant satisfaction survey

An occupant satisfaction survey has been developed for self assessments of the indoor environment. Please note that to apply for a NABERS Indoor Environment Tenancy and Whole Building rating, the occupant satisfaction survey must be undertaken online by one of the recognised NABERS providers listed above.

Instructions for a self assessment survey

All questions are rated on a scale of 1 to 7, with 1 being a very poor result that causes you discomfort or distracts you from your work and 7 being an excellent result for something that is noticeably pleasing. A score of 4 would indicate a neutral position where you are neither satisfied nor dissatisfied.

Please answer all questions and only answer each question once by placing a circle around the most appropriate answer. If you change your mind you can put a cross through your previous selection and then circle the new option.

If you have recently moved offices then please answer the questions as they relate to your new location only. If you work in more than one location in the same office (not in different buildings, the survey relates only to the current building) then please answer only for the space you occupy most of the time.

The survey is not intended to rate your satisfaction only on the day of completing the form, but you should try to remember conditions throughout the last year or as much of it as you can. For example, temperature conditions might be good in summer and poor in winter so your overall score should reflect this fact and how the building environment affects you throughout the entire year not just today or the last month. Similarly there might be an issue with space today because of packing boxes that you know will be moved shortly, but if the space has been good all year your score should reflect this.

Privacy

All survey results are confidential and no personal data will be collected. Individual results will not be analysed or distributed, but only the aggregated results will be used as part of a self assessment for the overall building or tenancy.

Survey questions

1 Thermal comfort

1a How satisfied have you been with the temperature level (i.e. whether you get too hot or cold) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

1b How satisfied have you been with the temperature stability (i.e. how much the temperature fluctuates during the day) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

1c How satisfied have you been with the level of airflow (i.e. do drafts make you uncomfortable, or is the air too still) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

1d How satisfied have you been with the humidity (i.e. do you feel either dry or clammy) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

1e Overall, do the thermal conditions (a combination of the above items) of this building interfere with your ability to get your job done, or enhance it?

Interfere *Enhance*

1	2	3	4	5	6	7

2 Air quality

2a How satisfied have you been with the odour (i.e. do smells distract you or limit your ability to perform your required tasks) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

2b How satisfied have you been with the level of dust (i.e. airborne and stationary) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

2c How satisfied have you been with the levels of mould and fungi (both smells and visual presence) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

2d How satisfied have you been with the levels of fresh air (i.e. at any stage do you feel stuffy, sleepy, or unnecessarily tired) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

2e When moving around your office, how satisfied have you been with the consistency (i.e. are the conditions the same in all parts of the workspace) of air quality at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

2f Overall, does the air quality (a combination of the above items) in your workspace interfere with or enhance your ability to get your job done?

Interfere *Enhance*

1	2	3	4	5	6	7

3 Acoustic comfort

3a How satisfied have you been with the level of air conditioning noise at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

3b How satisfied have you been with the levels of noise from outside the building (i.e. road traffic, aircraft, trains, pedestrians, events, etc.) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

3c How satisfied have you been with the level of general building equipment noise (i.e. lifts, machinery etc.) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

3d How satisfied have you been with your sound privacy (i.e. ability to have conversations without your neighbours overhearing and vice versa) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

3e How satisfied have you been with the amount and level of distracting noise (i.e. sudden or sustained noises coming from within the building or other occupants) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

3f Overall, does the acoustic comfort (a combination of the above items) interfere with or enhance your ability to get your job done?

Interfere *Enhance*

1	2	3	4	5	6	7

4 Lighting

4a How satisfied have you been with the quantity and quality of light (i.e. enough to perform your tasks without interference or eye strain) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

4b How satisfied have you been with the amount of glare (i.e. bright lights in your field of view or reflections on your screen) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

4c How satisfied have you been with the amount of light contrast (i.e. either finding it difficult to adjust to differing brightness levels, having strong shadows, or having very uniform and bland levels) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

4d How satisfied have you been with the amount of artificial lighting flicker at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

4e How satisfied have you been with the amount of natural light at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1 | 2 | 3 | 4 | 5 | 6 | 7

4f How satisfied have you been with the amount of lighting control (i.e. availability of dimmers, blinds for controlling natural light levels, etc.) at your workspace in the previous 12 months?

Very dissatisfied *Very satisfied*

1 | 2 | 3 | 4 | 5 | 6 | 7

4g Overall, does the lighting comfort (i.e. a combination of the above items) interfere with or enhance your ability to get your job done?

Interfere *Enhance*

1 | 2 | 3 | 4 | 5 | 6 | 7

5 Office layout

5a How satisfied have you been with the amount of work and desk space available for you to perform your job function in the previous 12 months?

Very dissatisfied *Very satisfied*

1 | 2 | 3 | 4 | 5 | 6 | 7

5b How satisfied have you been with the amount of storage available for you to perform your job function in the previous 12 months?

Very dissatisfied *Very satisfied*

1 | 2 | 3 | 4 | 5 | 6 | 7

5c How satisfied have you been with the location and arrangement of general office equipment (i.e. storage, printers, fax, copiers etc.) in the previous 12 months?

Very dissatisfied *Very satisfied*

1 | 2 | 3 | 4 | 5 | 6 | 7

5d How satisfied have you been with your proximity to a view (i.e. being able to see into the distance either through a window or pleasing outlook) in the previous 12 months?

Very dissatisfied *Very satisfied*

1 | 2 | 3 | 4 | 5 | 6 | 7

5e How satisfied have you been with the comfort of your office furnishings (i.e. chair, desk, computer, equipment, etc.) in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

5f How satisfied have you been with the appearance and quality of your office furnishings (i.e. chair, desk, computer, equipment, etc.) in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

5g How satisfied have you been with your ability to adjust your furniture to meet your needs in the previous 12 months?

Very dissatisfied *Very satisfied*

1	2	3	4	5	6	7

5h Overall, does the office layout (i.e. a combination of the above office layout items) interfere with or enhance your ability to get your job done?

Interfere *Enhance*

1	2	3	4	5	6	7

Responsible refrigerant use 3.9

Context

Synthetic refrigerants used in commercial property air conditioning systems have two main environmental impacts if they are released into the atmosphere:

- contributing to the depletion of the atmospheric ozone layer (ozone depleting potential, ODP)
- contributing to climate change through global warming (global warming potential, GWP). Some refrigerants have a global warming impact up to 3,000 times greater than CO_2 alone.

They also remain in the atmosphere for a very long time.

For these reasons, the control and phase-out of ozone depleting substances and synthetic greenhouse gases – from refrigerants and other sources such as foams, aerosols, solvents and fire extinguishers – is well underway. The original international agreement (the Montreal Treaty) was signed over 20 years ago and due to its success the mandatory timetable for the phase out of ozone-depleting substances has been accelerated.

As a result there has been a significant shift in the use and recovery of refrigerants in Australia. To continue this good performance you need to maintain a high standard of refrigerant management in existing buildings, including:

- being aware of your responsibilities e.g. it is illegal to deliberately release synthetic refrigerants such as chlorofluorocarbons (CFCs) or hydrochlorofluorocarbons (HCFCs) into the atmosphere
- eliminating leakage of refrigerants – up to 20% of refrigerants used in commercial properties leak into the atmosphere during operation or maintenance activities
- seeking alternatives to synthetic refrigerants based on both ODP and GWP (some low ODP refrigerants have very high GWP e.g. R410A has a GWP of 2000)
- reclaiming unwanted refrigerants for destruction.

What's in this section

Making the transition to alternative refrigerants

In 1996 the Australian Government ended imports and manufacturing of CFCs and introduced controls on imports and manufacturing of HCFCs. The use of these transitional synthetic-based refrigerants was permitted to allow the industry to develop zero-ODP alternatives. Imports of HCFCs peaked in 1998–1999 and are subject to a phase-out quota system. Substantive imports will cease by 2020 with only very limited supplies then available until 2030 to service remaining HCFC-dependent equipment.

The commonly used transitional refrigerants are HCFCs such as R22 and R123. Because transitional refrigerants will also be phased out, many manufacturers are already moving to zero-ODP, chlorine-free substitutes such as hydrofluorocarbons (HFCs). HFCs include R134a, R407C and R410A, depending on the operating temperature of the air conditioning and heat pump systems.

Licensing and importation of transitional refrigerants is administered by the Australian Government Department of Environment, Water, Heritage and the Arts.

Source: *Air Conditioning and Refrigeration Industry Refrigerant Selection Guide 2003*, Australian Institute of Refrigerants, Air Conditioning and Heating (AIRAH), www.airah.org.au

Natural refrigerants

With the increased focus on refrigerants it's likely that more refrigeration system designers and users will select natural refrigerants as an alternative. In addition to having zero ODP and low or zero GWP, they are compatible with common materials found in refrigerating systems and are soluble in conventional mineral oils. They contain no chlorine or fluorine atoms so do not react with water to form the strong acids that can lead to premature system failure. For more information see *Air Conditioning and Refrigeration Industry Refrigerant Selection Guide 2003*, AIRAH, www.airah.org.au

Reclaiming refrigerant

'Refrigerant Reclaim Australia (RRA) is a not-for-profit organisation based in Canberra that works nationally with the refrigeration and air conditioning industry to share responsibility and costs to recover, reclaim and destroy ozone depleting and synthetic greenhouse gas chemicals.

RRA reports increasing amounts of refrigerants being collected annually, with more than 2,400 tonnes recovered and collected by June 2008. This equates to approximately 8 million tonnes of ozone saved and the equivalent of approximately 8 million tonnes of CO_2 emissions prevented. The work is not over yet – there are thousands more tonnes to collect across Australia.

RRA uses an Australian-developed plasma-arc technology and plant owned and operated by BCD Technologies to destroy refrigerants. This transforms fluorocarbon refrigerants, such as CFCs and HCFCs, to salts and water, with a higher than 99.999% efficiency.

In 2003, RRA expanded its recovery program to include the synthetic gases listed by the Kyoto Protocol, HFCs and PFCs, the collection and safe disposal of which is now mandatory.'

Refrigerant Reclaim Australia

Steps: Managing refrigerants

1 Review refrigerants and equipment used

Identify your baseline by carrying out a review of all the types of equipment and refrigerants used in each plant or system. You could use Worksheet 3.9A as a template for this review.

Develop a refrigerant register and keep it up to date. Use the register to record the type and quantity of refrigerants used and stored on the property. Worksheet 3.9B is an example register.

Use the refrigerant register, or similar, to account for any estimated or measured losses in refrigerants. Make sure building management reports acknowledge refrigerant losses and recommend remedial measures.

Include an evaluation of the refrigerant loss risks when undertaking regular HVAC inspections and maintenance.

2 Check contractors credentials

Make sure all contractors responsible for maintaining and installing equipment that uses refrigerants have the appropriate licence and registration, as required by government regulations.

Check maintenance specifications

Check that contractors' licensing requirements are included in the maintenance specifications for all HVAC equipment.

Check that the maintenance specifications also require contractors to take particular caution when handling refrigerants to avoid accidental losses.

Where to find an authorised organisation

The Australian Refrigeration Council Ltd (ARC) administers the licensing of refrigerants handling and authorised refrigerant trading organisations. You can find more information and search for a certified contractor on their website: www.arctick.org/index.php.

3 Check leak detection and containment systems

Refrigeration equipment should be located in moderately air-tight enclosures with a refrigerant leak detection system covering the high-risk part of HVAC plant such as chillers.

Where no refrigerant containment system is in place, or where containment may be inadequate, upgrade containment using the latest technologies to minimise refrigerant loss in the event of leakage or handling errors.

- Install refrigerant detectors where feasible.
- Specify that refrigerant dye be installed in compressors during maintenance activity, in accordance with manufacturer's advice, to assist in showing leakages.
- Where old CFC or HCFC refrigerants are used consider halide torch detectors.
- Leak detection systems should be installed and maintained where more than 100 kg of a refrigerant gas is located within one chiller unit in areas where ventilation is likely to be poor.

Using alternative or natural refrigerants

Alternative refrigerants such as ammonia, carbon dioxide and hydrocarbons are being used in specifically designed plant and equipment for suitable applications. Because they occur in nature, they are often referred to as the 'natural' refrigerants.

As alternatives to fluorocarbon refrigerants, natural refrigerants can also help to facilitate the heat transfer process, at the same time mitigating some of the environmental risks of global warming and ozone depletion.

These substances have been used as refrigerants for many years and they are now finding their way into commercial applications where fluorocarbons have previously been the preferred option.

Ammonia is widely used for cool stores and carbon dioxide is being trialled in some supermarkets and data centres.

While hydrocarbons are used on industrial and petrochemical sites, they were also trialled in ice-cream cabinets and drink fridges during the Sydney Olympics in 2000.

Where the application of natural refrigerants may not directly affect a commercial property at this stage, their uses will be relevant to the greening of the supply chain. See Section 5: 'Sustainability and the Supply Chain'.

For case studies about using natural refrigerants see www.airah.org.au/downloads/natural-refrigerants-case-studies.pdf

4 Develop a refrigerant management plan

Develop a plan to replace fluorocarbon refrigerants with alternative refrigerants. Seek to reduce storage of refrigerants to an absolute minimum, and eliminate it altogether if possible.

Keep informed about local and international advances in transition refrigerants and in adoption of natural refrigerants as replacements for synthetic ones. Government and industry websites and trade publications regularly provide updates on progress, issues and regulatory expectations.

Consult with equipment manufacturers and design consultants to better understand the feasibility of early retrofit of existing equipment with lower ODP and GWP refrigerant alternatives such as HFCs. Where feasible, include retrofit in cyclic maintenance or upgrade projects.

When major refurbishments or upgrades are planned and chillers are to be replaced, make sure the design team comprehensively evaluates the use of alternative low-impact synthetic or natural refrigerants and avoids specifying building materials which use fluorocarbon refrigerants in their manufacture, for example polystyrene materials that use fluorocarbons as a blowing agent. See Section 5: 'Sustainability and the Supply Chain'.

5 Recover refrigerants

Consider refrigerant recovery systems such as those that automatically pump refrigerants to a sealed tank or heat exchanger with isolation valves. Automatic systems can be more reliable and, unlike manual procedures, not subject to handling risks and resulting fugitive emissions.

Make sure all recovered refrigerants are sent to RRA. Note that RRA pays a rebate per kilo of returned refrigerant (see www.refrigerantreclaim.com.au).

6 Engage stakeholders

Provide advice to tenants about alternative refrigerants and proper maintenance practices associated with their supplementary HVAC equipment.

Raise staff and tenants' awareness of global warming and ozone depletion and suggest measures they could take, in addition to improved energy efficiency, to contribute to solutions. For example, suggest they avoid purchasing polystyrene cups made using synthetic refrigerants. See Section 5: 'Sustainability and the Supply Chain'.

Rewarding lower ODP and GWP

'The Green Star rating scheme rewards a range of initiatives:

- where refrigerants have to be used, selecting ones with zero ODP and GWP less than 10
- having leak detection systems
- using automatic refrigerant recovery systems
- using thermal insulation materials with zero ODP.'

For more information visit the Green Building Council of Australia's website: www.gbca.org.au

Recognising lower ODP and GWP

'The Australian Environmental Labelling Association (AELA) has developed voluntary standards to benchmark products or services as part of the Australian Ecolabel Program. If the standards are achieved a Good Environmental Choice Label is awarded. A standard has been developed for all categories of refrigerant products including domestic and industrial air conditioning refrigerants. A refrigerant qualifies for the Good Environmental Choice Label if it complies with:

- zero ODP
- GWP less than or equal to 50.

The Australian Ecolabel Program also has a standard for thermal building insulation materials which considers their ODP and GWP.'

For more information visit www.aela.org.au and www.geca.org.au

Further information

- *Air Conditioning and Refrigeration Industry Refrigerant Selection Guide 2003*, AIRAH, www.airah.org.au
- For licensing requirements for handling synthetic gases (refrigerants) and refrigerant trade: Australian Refrigeration Council, www.arctick.org/index.php
- *Australian Standard HB 40.1-2001: The Australian Refrigeration and Air-conditioning Code of Good Practice – Reduction of emissions of fluorocarbon refrigerants in commercial and industrial refrigeration and air-conditioning applications,* www.saiglobal.com/shop/script/Details.asp?DocN=AS624407634280
- The Australian Refrigeration Council Ltd. (ARC) administers the licensing of refrigerants handling and authorised refrigerant trading organisations: www.arctick.org/index.php
- For information on ozone and synthetic greenhouse gases, Montreal Protocol and regulations: Australian Government Department of Environment, Water, Heritage and the Arts, www.environment.gov.au/atmosphere/ozone/index.html
- Green Building Council of Australia:
  Green Star Office Design & Office As Built Version 3, 2008, www.gbca.org.au
- Good Environmental Choice Label, www.geca.org.au/standards/GECA%2026-2005%20-%20Refrigerants%20v1.2.pdf
- Australian Environmental Labelling Association (AELA), www.aela.org.au
- Refrigerant Reclaim Australia, www.refrigerantreclaim.com.au

Using refrigerants safely

Care should always be taken with refrigerants as they can have a range of toxicity and flammability risks. Refer to the AIRAH Refrigerant Selection Guide 2003 (www.airah.org.au).

With wider use of new technology and alternative refrigerants, people working in the refrigeration industry need to increase their practical and theoretical knowledge of alternative and natural refrigerants – particularly hydrocarbons. Make sure your contractors are up-to-date with the latest technical and safety information. Industry bodies such AIRAH can provide this information and training.

www.airah.org.au

Worksheets

Review and use these Word documents:

3.9A Refrigerant and equipment review

3.9B Refrigerant gases register

Worksheet 3.9A

Refrigerant and equipment review

This is an example only – adapt this worksheet to suit your organisation's requirements.

Property name:		
Property address:		
Name of refrigerant/HVAC contractor:		Contractor's licence number:
Review date:	Review prepared by:	Review approved by:

1 Equipment details
What is the age of the plant?
What is the life expectancy of the plant?
What refrigerant is used?
What type of lubricant is used?
What type of elastomers (rubber/plastic seals, gaskets etc.) and metals are used?
Describe other system components:
What is the compressor type? (e.g. hermatic, semi-hermatic or open drive)
Can the existing compressor be converted?
What are the system operating pressures?
Are there alternative refrigerants available that are suitable for the existing system operating pressures?
Are there alternative refrigerants available that are chemically compatible with the existing system? What is the likely impact on type of lubricant, elastomers (rubber/plastic seals, gaskets etc.) and metals used?
What is each system's required cooling capacity?
What is each system's shortfall or surplus cooling capacity?
Is refrigeration equipment located in moderately air-tight enclosures? Describe.
Is the refrigerant containment system adequate?
Is there a refrigerant leak detection system, maintained in good working order?
Is there more than 100 kg of a refrigerant gas located within one chiller unit in areas where ventilation is likely to be poor?

Does the refrigerant leak detection system cover the high risk parts of HVAC plant such as chillers?

2 Refrigerant usage
What is the total quantity of each chlorinated and alternative refrigerant being stored on site in the existing system and equipment? (Complete register in Worksheet 3.9B)
Is the system leaking refrigerant? (Refer to annual usage figures or leak detection system.)
What steps have been undertaken to stop leaks?

3 Management options	
❑	**Continue to use existing plant** [Only an option if the system is leak free.] A leak detection system is installed and an emergency plan is in place in case of system failure.
❑	**Leak reduction** A leak detection system is installed. Equipment must be replaced if it leaks.
❑	**Refrigerant recovery and reuse** Refrigerants from old plant that has been decommissioned must be recovered. Refrigerant should only be handled by a qualified refrigeration engineer or accredited technician.
❑	**Use alternative refrigerant** Replacement has low or zero ozone depletion potential (ODP) and low or zero global warming potential (GWP). Replacement refrigerant also has high efficiency and safety of use.

Source: Based on steps outlined in *Air Conditioning and Refrigeration Industry Refrigerant Selection Guide 2003*, Australian Institute of Refrigerants, Air Conditioning and Heating (AIRAH). For more information see www.airah.org.au

Worksheet 3.9B

Refrigerant gases register

This is an example only – adapt this worksheet to suit your organisation's requirements.
Retain register on building management records.

Property name:		
Property address:		
Name of refrigerant/HVAC contractor:		Contractor's licence number:
Register date:	Prepared by:	Approved by:

Existing refrigerants used						**Upgrade information**		
Plant/item description	**Location**	**Refrigerant**	**Quantity charged (kg)**	**Date charged**	**Estimated loss**	**Retrofit date**	**Retrofit cost**	**Alternative refrigerant**
		Total quantity on site (kg)		Total estimated loss (kg)				

Total summary	
Total quantity refrigerants stored on site (kg)	
Total estimated refrigerant loss (kg)	
Date measured	
Measured by (name)	