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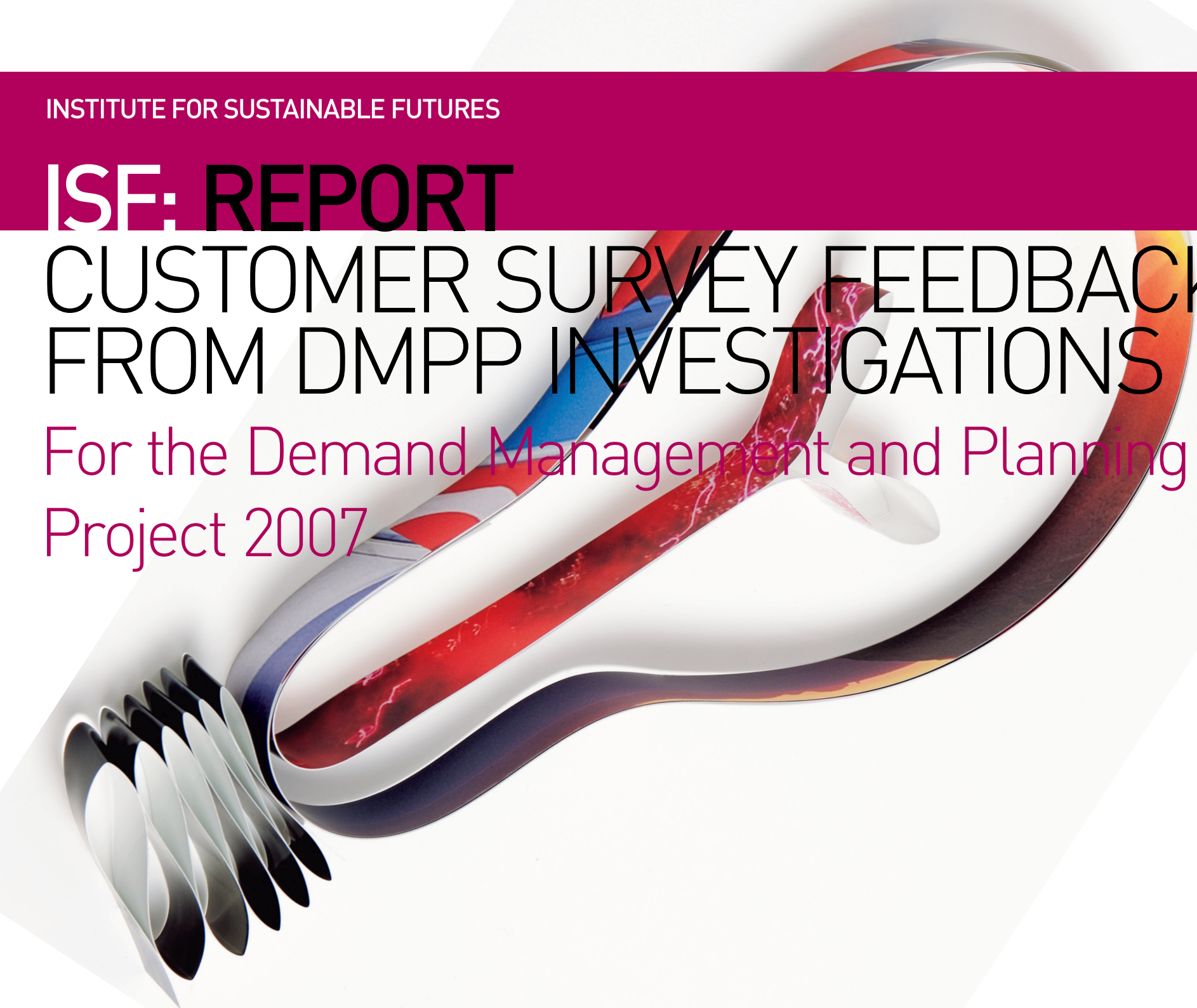
# ISF: REPORT

# CUSTOMER SURVEY FEEDBACK FROM DMPP INVESTIGATIONS

## For the Demand Management and Planning Project 2007



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# CUSTOMER SURVEY FEEDBACK FROM DMPP INVESTIGATIONS

For the Demand Management and Planning Project

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Institute for Sustainable Futures

# Disclaimer

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# Executive summary

This is the report of a research project undertaken by the Institute for Sustainable Futures (ISF), at the University of Technology, Sydney, on behalf of the Demand Management and Planning Project (DMPP) at the NSW Department of Planning. The Institute was engaged to undertake the study as a follow-up to a series of building energy audits conducted by the DMPP. The DMPP intends to use the results to inform future energy efficiency and peak demand reduction strategies.

The project consists of a customer survey and a complementary literature review. The survey explores the responses of DMPP customers to the audit reports and their general views about energy efficiency issues. The purpose of the survey was to find out what energy efficiency opportunities have been taken up by organisations and to explore any barriers to take-up. The review of key recent international and Australian research and policy literature on energy efficiency in buildings was included to allow a comparison of the survey results with previous findings in the field.

The Institute developed an online survey that was sent to 353 DMPP energy audit customers. A total of 79 completed surveys were received, representing a response rate of 22 per cent.

## *Survey results*

The majority of respondents (81 percent) reported having received the DMPP audit report.

The survey shows that a high proportion of organisations (89 per cent) had implemented at least some energy efficiency measures. The most common (reported by over 60 per cent of organisations) were installation of more energy efficient lighting and power factor correction. Measures reported by over 40 per cent of organisations were HVAC efficiency upgrades and installation of more efficient drives or motors. Around one third reported organisational process or policy improvements and a quarter mentioned standby generation. The least commonly implemented measures are fuel switching and load shifting (both reported by only 1 in 10 respondents).

Reasons for 'not doing more' to implement energy efficiency measures were varied. The most common reason, reported by 43 per cent of organisations, is that the DMPP energy audit report is 'still being discussed'. Around one quarter of organisations reported that measures were too expensive or did not satisfy their investment criteria, and one-fifth thought that their organisation was interested but had more urgent priorities. Inadequate internal resources were cited by 15 per cent of organisations. A small minority of

respondents (5 people, or 6 per cent) reported that they had received the DMPP audit report but lacked confidence in its recommendations. Other suggested reasons appear insignificant, including lack of information, landlord/tenant issues and inability to find a supplier/ installer. This last is consistent with another finding, that the vast majority of respondents see the market for energy efficient technologies and services as able to meet the needs of their organisation.

When asked what kinds of assistance were most likely to encourage their organisation to take up energy efficiency measures, respondents showed a clear preference for financial incentives – cited by 70 per cent of respondents – and far more popular than any other measure. However, significant proportions of respondents thought that technical assistance (39 percent), an increased IRR (30 percent), energy performance contracting (28 percent), or business case assistance (28 percent) would be effective.

The majority of respondents (81 percent) thought their organisation had an 'energy champion'. Of these, 41 per cent pointed to the energy/environmental manager, 34 per cent cited the building/tenant manager, 12.5 per cent thought that both these people were 'champions' and 12.5 per cent thought that someone else was a champion.

The majority of respondents thought energy efficiency was at least 'moderately' important to their organisation and almost three quarters assessed it as 'very' important to their organisation. Over 40 per cent gave it the highest ranking possible – indicating that they thought energy efficiency was 'essential' to their organisation.

With regard to the classification of energy costs in organisational budgets, almost half the respondents reported that energy is classified as a variable cost, with only one third classifying it as a fixed cost.

When asked to rank the importance of 'environmental performance generally' to their organisation, respondents thought it was less important than energy efficiency, although it was still ranked highly overall, and a clear majority considered it to be very important. Energy efficiency appears to have a higher profile compared to other environmental performance categories for buildings.

### *How the survey findings relate to the literature review*

The report's conclusion reflects on the results of the survey in the context of the findings of the literature review. It concludes that, while the literature recommends a range of pre-requisites to encourage energy efficiency in buildings, only some of these appear to be satisfied as far as the surveyed DMPP customers are concerned. These include:

- awareness by users that energy efficiency is an issue, and
- access to energy efficient products and services.

The survey suggests that other pre-requisites for encouraging energy efficiency identified in the literature are not fully satisfied. These include:

- affordability
- willingness/ motivation to take action and give priority to energy efficiency, and
- ability/ authority to make decisions regarding energy efficiency.

Both the literature and the survey identify a number of barriers relating to these factors, which fall mainly into the categories of 'limited financial incentive' and 'organisational barriers'. Accordingly, the kinds of assistance that appear most likely to be effective are those that address these barriers.

The perception that limited financial incentive for energy efficiency exists, highlights a current market failure that government can address by providing, for example, direct payments such as grants for energy efficiency, and promoting mechanisms that reduce upfront costs, such as energy performance contracting and low interest loans. This is a key area of focus in driving the mainstream adoption of energy efficiency.

The survey findings on organisational barriers are reinforced by responses to the question on 'types of assistance considered likely to be effective'. 'Technical assistance' was the second most common response (almost 40 percent) and more than a quarter identified 'energy performance contracting' (which removes some of the organisational risk and effort barriers) and 'business case assistance' as types of assistance they would consider effective.

There are a few apparent discrepancies between the survey and the literature reviewed. Split incentives between tenants and building owners were identified by the literature as a considerable barrier to energy efficiency in buildings. This was not a prominent finding of the survey, with only 5% of respondents citing resistance from tenants or landlords as an issue. However, 84% of respondents were building owners, so the tenant perspective on landlord attitudes to energy efficiency was under-represented.

Whilst the literature review indicated that energy efficiency had limited appeal to organisations (as a small component of total business costs), the survey showed an apparently high level of interest in energy efficiency. Over 70% of respondents saw it as 'important' or 'essential'. There are a number of possible reasons for this apparent discrepancy. Survey recipients who provided a response (22%) may be more likely to value

energy efficiency than those who failed to respond. Also, 84% of respondents were building owners, who are likely to value energy efficiency more than tenants.

Taken together, the literature review and the survey results provide a valuable resource for DMPP to refer to in developing future energy efficiency strategies. The research results suggest a need for future DMPP strategies to focus on:

- Removing barriers associated with upfront cost and access to capital, using mechanisms that could include direct grants, energy performance contracting and low interest loans for energy efficiency improvements. Policy actions that would support this, but which are outside DMPP's immediate control include energy pricing that includes externalities, taxation reform and carbon trading.
- Encouraging less conservative investment criteria (eg. expectations for rate of return), by providing more 'business case' support and demonstrating the low risk of investments in energy efficiency (coupled with incentives that remove cost barriers as described above).
- Incorporating organisational change strategies more comprehensively into the audit program. The exact approach requires further consideration, and could possibly include methods to involve a cross-section of each organisation's staff in the audit process (including senior management and financial staff); providing support to management on the 'business case' (including relationship to other organisational priorities) and providing tailored 'hands on' implementation advice and technical support.

## Acknowledgements

The authors would like to thank Chris Tully at the Demand Management and Planning Program at the Department of Planning for giving us the opportunity to undertake this work. Thanks also go to the many building managers and others who took the time to complete our survey. We would also like to thank Lucy Hall at ISF for assisting with the administration of the survey, Chris Riedy and Stuart White for their advice and input throughout, and Ann Hobson for editorial assistance.

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# 1 Introduction

## 1.1 Background

The Demand Management and Planning Project (DMPP) has previously conducted energy audits at a large number of sites in both the Sydney CBD and the St George-Sutherland area. The objective of the audits was to identify to identify opportunities to improve energy efficiency and reduce peak demand.

The current project undertaken by the Institute is a follow-up study to explore the responses of DMPP customers to the audit reports, and to seek their views about energy efficiency issues more generally. The purpose of the research is to find out what energy efficiency opportunities have been taken up by various organisations, and to explore any barriers to take-up, as well as potential opportunities for overcoming these barriers.

The results will inform future energy efficiency and peak demand reduction strategies. In particular, they will help the Department respond more effectively to the needs of the organisations it works with, by designing effective strategies to encourage and support organisations to take up energy efficiency opportunities.

## 1.2 Approach

The approach taken by ISF was to develop and deliver an online survey to the DMPP energy audit customers, and to conduct a complementary literature review.

The aim of the survey was to collect data on whether the respondent (or their organisation) had received the audit report, what (if any) energy efficiency measures they had undertaken, and where applicable, their reasons for not implementing such measures. It also aimed to determine what kinds of strategies would be likely to encourage or enable organisations to take up further energy efficiency and demand reduction opportunities.

The literature review was designed to complement the survey, by drawing out the findings of similar research previously undertaken in Australia and elsewhere. This would then enable a reflection on whether the survey had uncovered common or new barriers. Where particular barriers have been identified in previous research, the literature review would draw out any 'lessons learned' about how these barriers can be overcome.

This approach will allow future DMPP work to both draw on the findings of its own customer survey and consider understandings gained from previous work in the field.

# 2 Survey methodology

This section describes the process that was undertaken to develop and deliver the survey. Survey results and analysis are in Section 3.

## 2.1 Survey preparation

Chris Tully provided a previous survey used in a phone survey by LC ASSOCIATES PTY LTD. ISF reviewed and refined this survey for use in the current project. The survey was expanded from 12 to 15 questions, a number of wording changes were made to improve the clarity of the questions, some questions were deleted and others considered more appropriate or useful were added. The format of the survey was also amended for use in an online context.

The new survey was developed in consultation with, and the final version approved by, Chris Tully.

## 2.2 SurveyMaster set up

The refined survey was set up on the UTS *SurveyMaster* software to enable online delivery. The survey was set up in 'test mode' to allow testing and review by Chris Tully, and piloting by ISF. Following the pilot, the survey format was finalised.

The survey, as it was delivered in *SurveyMaster* format, is at Appendix A.

## 2.3 Compilation of customer database and mailing list

Chris Tully provided the energy audit customer information to ISF by way of four separate Excel spreadsheets. In order to make this information useful for the delivery and analysis of the survey, it was necessary for ISF to undertake additional[1] work on the databases. This included consolidating the four Excel files, data manipulation, exporting to Microsoft Access, combining multiple entries for singles sites, and sorting the data in consistent ways.

This work was necessary not only to compile a useable mailing list for the survey, which captured all customers and captured them once only, but also to enable effective data analysis by ensuring that the individual survey responses would be able to be matched to the detailed customer/site information.

[1] As this work was not envisaged in the original proposal, a variation has been submitted, including an additional fee. This approach was agreed between Emma Partridge and Chris Tully by phone on 8 November 2006, and confirmed by email on 6 December 2006.

The consolidated Excel® file and the Access® database have been forwarded to Chris Tully separately.

## 2.4 Survey delivery

An email was composed requesting recipients to complete the survey. The email provided brief information on the purpose of the survey and a hyperlink that would take recipients to the online survey for completion.

A copy of the email text can be found at Appendix B.

This email was then sent to each of the customer contacts that had been extracted from the consolidated customer databases – 389 different email addresses.

The email informed recipients that they had a two-week period in which they could access and complete the survey. A reminder email was sent after one week.

Some recipients responded directly to ISF by email – these were tracked on a spreadsheet. Some advised that they were not the right person but that they had forwarded it to another relevant person in the organisation (the original email encouraged this). Others made comments about the project by email – these were replied to and encouraged to fill out the survey so that their comments could be formally included.

Apart from these, which ISF was able to follow up individually, 42 other emails came back as 'undeliverable' or 'user unknown' or something similar. These were followed up by phone – a process that resulted in ISF obtaining 11 alternate email addresses and sending the survey to those. This left 31 undeliverable addresses. Another five emails generated an automated 'out of office' reply – where the person was not due back until after the close of the survey. Not counting these 36 addresses, it can be assumed that the survey reached 353 people in total.

## 2.5 Data analysis

The responses to the survey were collated and quantitative and qualitative analysis undertaken. The results of the survey are contained below in Section 3.

## 2.6 Literature review

The second component of this project is a literature review in which ISF identified, collected and reviewed key recent international and Australian research reports and policy discussion papers on energy efficiency in buildings. The literature identified for inclusion focused on

the barriers and opportunities faced by organisations in implementing energy efficiency/ demand management strategies identified by programs such as DMPP's energy audits.

The findings of the literature review are written up in Section 4 below.

## 2.7 Final report

This Report contains all research findings and results and reports the Institute's conclusions drawn from the survey and literature review. It assesses the impacts of the DMPP audits, describes the main barriers to organisational uptake of demand management measures, and canvasses the potential opportunities for improving uptake in the future.

# 3 Survey results

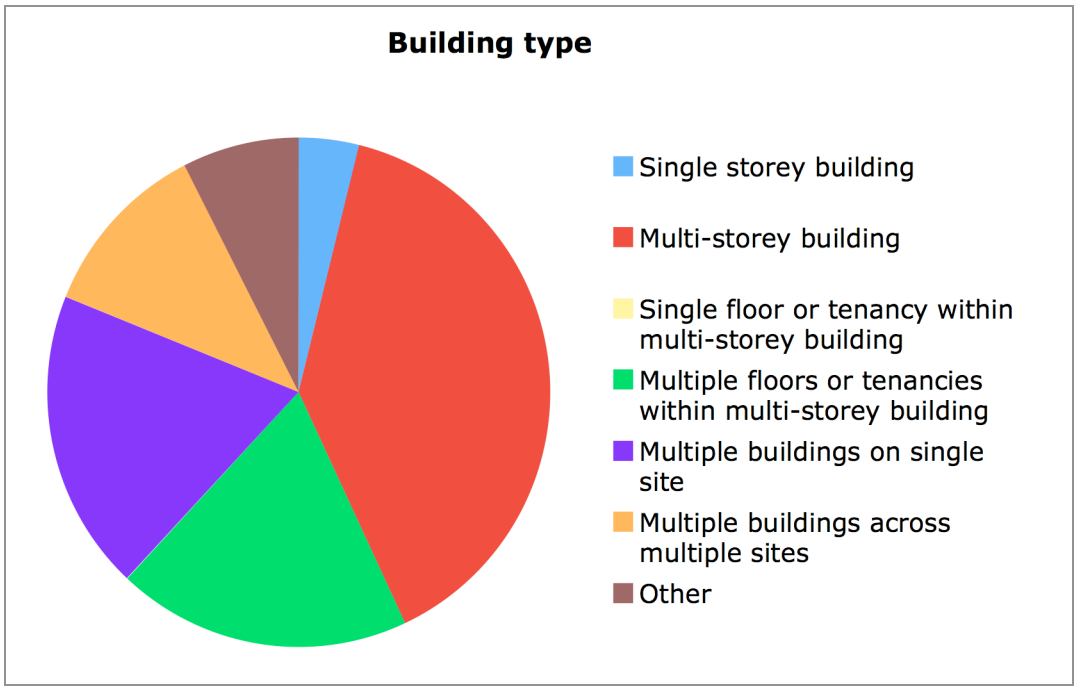
## 3.1 Response rate

At the end of the two-week survey period, 79 completed surveys had been received. This represents a response rate of 22%.

## 3.2 Profile of responding organisations

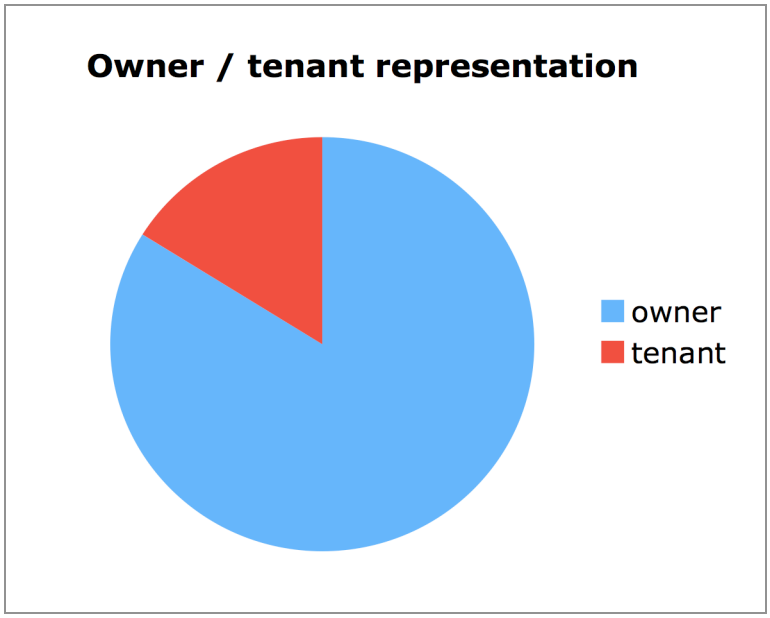
### 3.2.1 Building type

Respondents were asked what kind of building(s) they were responsible for. Results show that the largest group (39 percent) was responsible for a multi-storey building. Almost one fifth (19 percent) were responsible for multiple floors or tenancies within a multistorey building, and the same proportion for multiple buildings on a single site. Only nine respondents (11 percent) were responsible for multiple buildings across multiple sites, and three respondents (4 per cent) for a single storey building. No respondents were responsible for a single floor or tenancy within a multistorey building. Six respondents (9 percent) categorised their building type as 'other'.



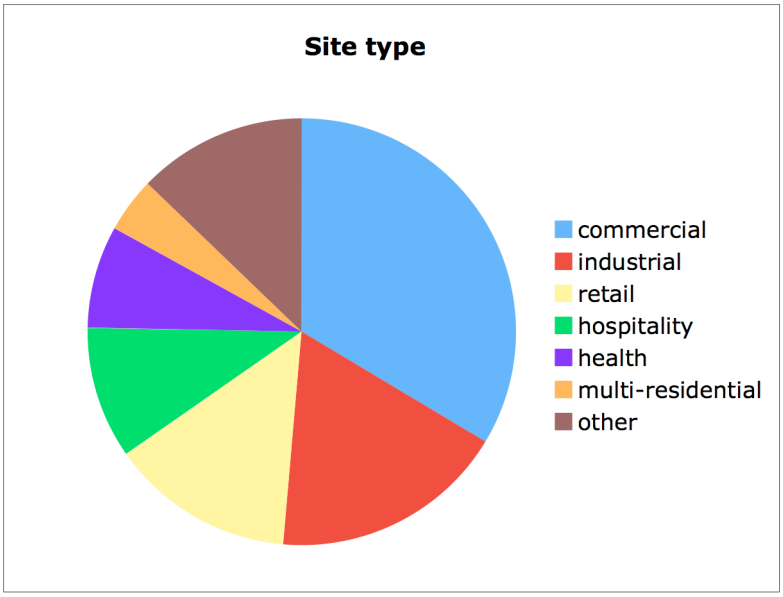

### 3.2.2 Owner / tenant representation

The majority of respondents (84 percent) represented a building owner, with the remainder (16 percent) representing a building tenant.




### 3.2.3 Site type

Respondents represented a wide variety of site types. The most common was commercial (34 percent), followed by industrial (18 percent) and retail (14 percent). Hospitality sites made up 10 per cent of the sample, health sites 8 percent2, and multi-residential sites 4 percent. Ten respondents (13 percent) categorised their site type as 'other'[3].

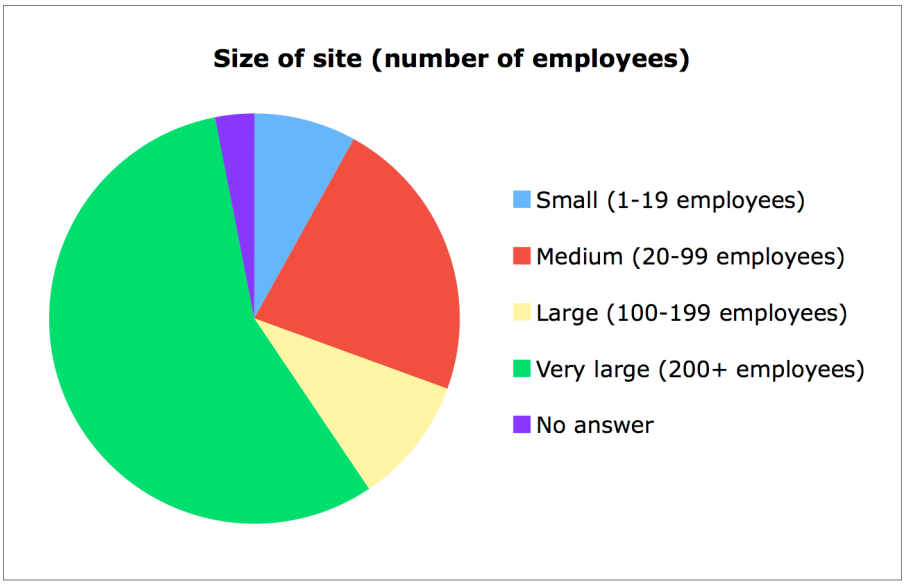



[2] While health was not a category provided in the survey options, six respondents who categorised their site as 'other' specified that it was a healthcare facility (such as a hospital, dental hospital or other health facility).

[3] Of these, three specified a sports or recreation site and two an educational site. The remaining were a government office, community facility, data centre, a communications site and a television site.

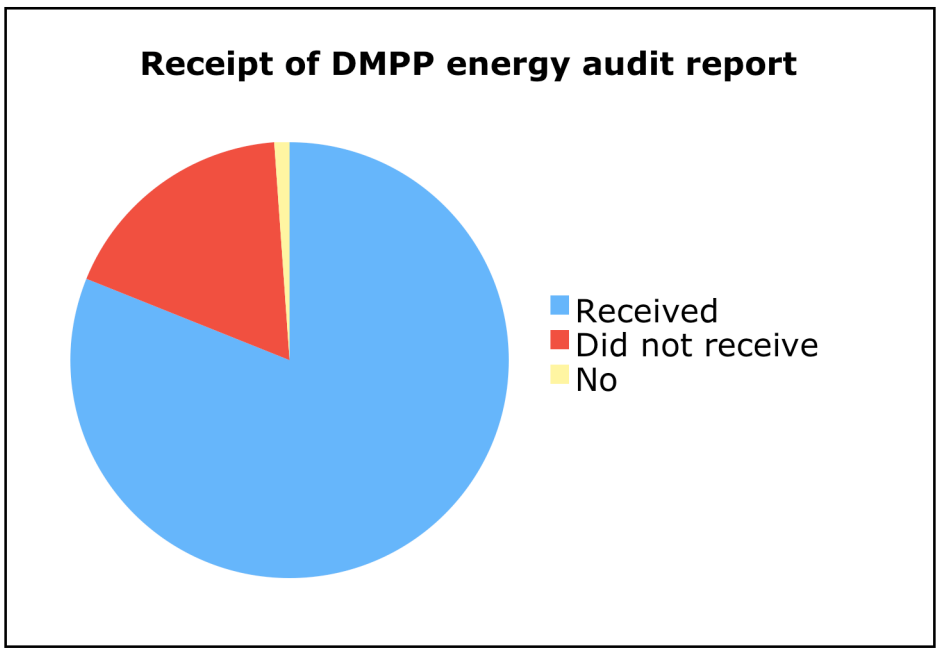
### 3.2.4 Number of employees

Almost half the sites (45 percent) were very large in terms of number of employees, with over 200 people employed on site.




### 3.2.5 Receipt of DMPP energy audit report

The majority of respondents (81 percent) reported having received the DMPP report following the recent energy audit of their site[4].




[4] ISF has separately provided Chris Tully with the details of those fourteen customers who indicated that they had not received the report, to enable a copy to be sent to them.

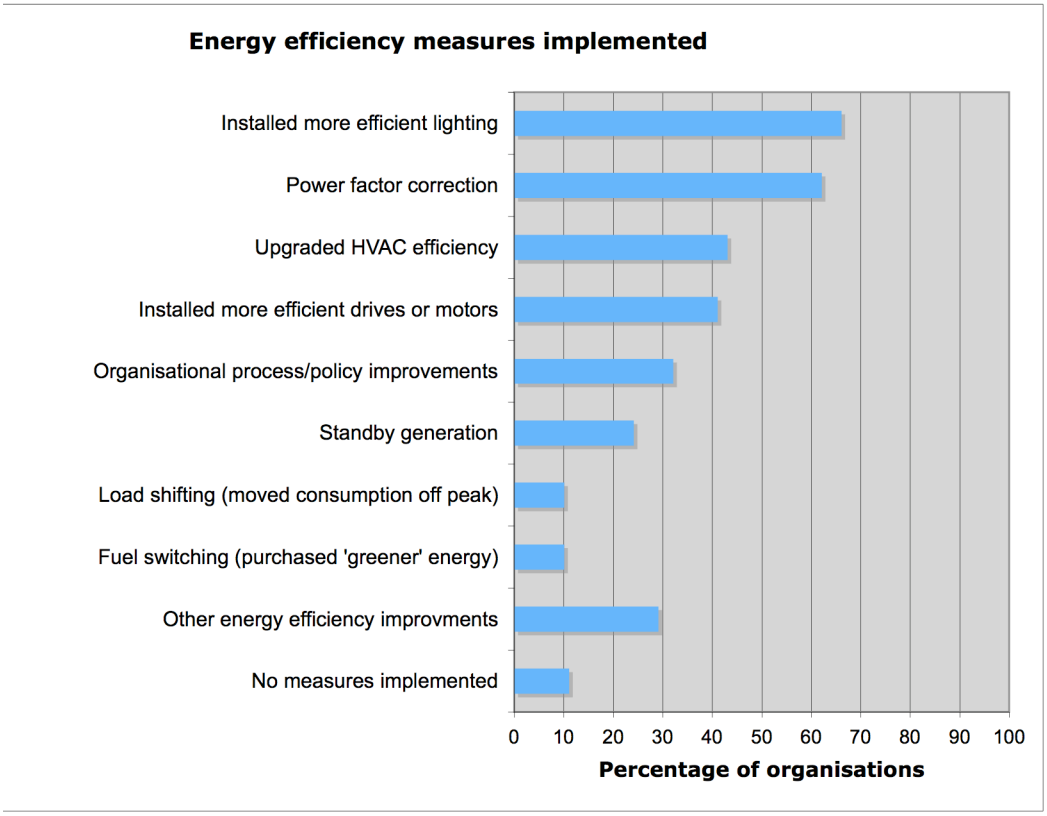
### 3.2.6 Energy efficiency measures implemented

Respondents were asked whether their organisation had implemented any energy efficiency measures, and if so, what kind they had implemented.5

The most commonly implemented measures (reported by over 60 per cent of organisations) were installing more energy efficient lighting and power factor correction. Measures reported by over 40 per cent of organisations were HVAC efficiency upgrades, and installation of more efficient drives or motors. Around one third reported organisational process or policy improvements, and a quarter mentioned standby generation.

The survey suggests that the least implemented types of energy efficiency improvements made by organisations are fuel switching and load shifting (both reported by only 1 in 10 respondents).

Only a small minority (11 percent) reported having implemented no energy efficiency measures at all, while 29 per cent reported implementing measures 'other' than those listed.



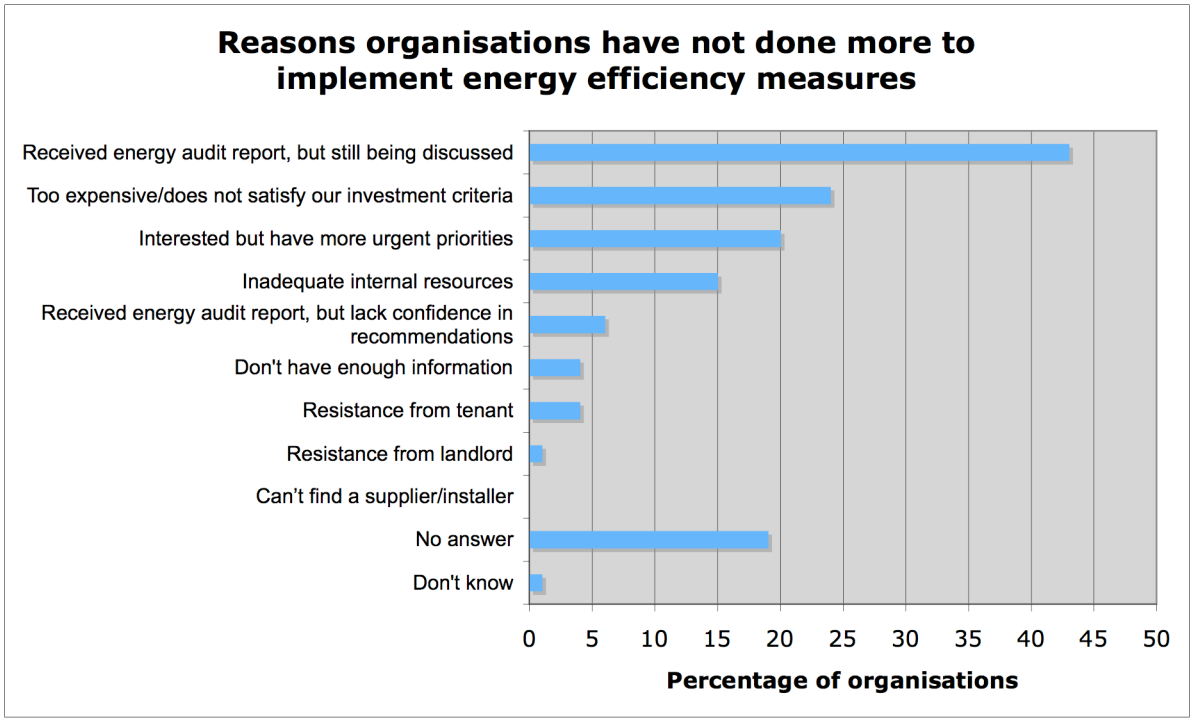

[5] It should be noted that this was asked as a general question, so the answers will cover all measures implemented by the organisation, whether or not they were implemented as a result of the DMPP energy audit report.

### 3.2.7 Reasons for not implementing energy efficiency measures

Respondents were asked to provide reasons why their organisations was 'not doing more' to implement energy efficiency measures. The survey provided a list of possible reasons and asked the respondent to 'tick the main reasons'. The results show that the most commonly reported reason, cited by 43 per cent of organisations is that the DMPP energy audit report is 'still being discussed'. Around one quarter of organisations reported that measures were too expensive, or did not satisfy the organisation's investment criteria, and one-fifth thought that their organisation was interested, but had priorities that were more urgent. Inadequate internal resources were cited as a reason by 15 per cent of organisations.

A small minority of respondents (5 people, or 6 percent) reported that they had received the DMPP energy audit report, but lacked confidence in its recommendations. Other suggested reasons appear insignificant, including lack of information, landlord/tenant issues and inability to find a supplier/ installer.

Interestingly, almost one in five respondents did not answer this question. This may indicate that they do not know the reason (although 'don't know' was an option to tick in this question), or it may mean that there is some other reason for their organisation's inaction. However, it is also possible that respondents felt their organisation had 'done all it can' on this issue or they did not know what other opportunities are available, and so did not feel able to answer the question.



### 3.2.8 Views about the market for energy efficiency technologies and services

The vast majority of respondents felt that the market for energy efficient technologies and services was able to meet the needs of their organisation. Only five respondents (6 percent) expressed a view to the contrary. Asked to explain why they felt the market could not meet their needs, two respondents referred to issues that are not really relevant to the issue of the market – namely that the building is being rebuilt, or that it was an issue for the tenant. The three relevant issues mentioned were:

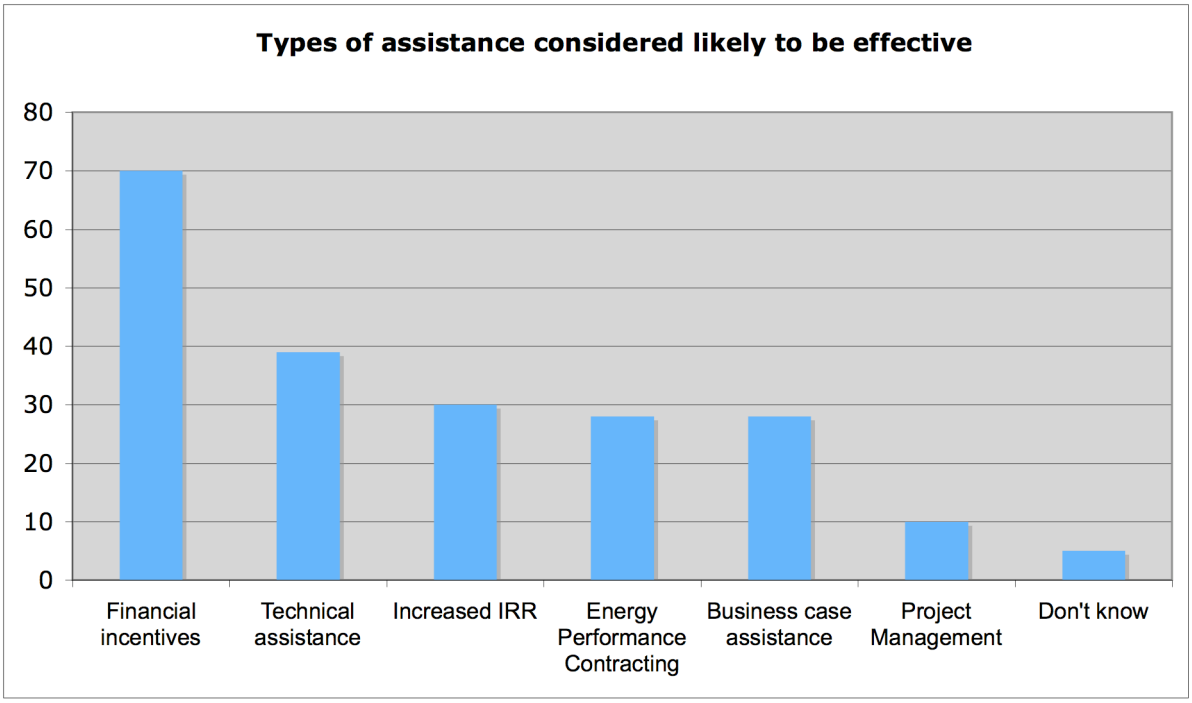
- *The cost of replacing is not practical*
- *Need customer friendly environment a/c, lighting* [response from a retail site]
- *Technology could adversely affect reliability* [response from a data centre]

### 3.2.9 Types of assistance considered likely to be effective

When asked what kinds of assistance were most likely to encourage their organisation to take up energy efficiency measures, respondents showed a clear preference for financial incentives – this measure was cited by 70 per cent of respondents, and was far more popular than any of the other measures.

However, there were significant proportions of respondents who thought that technical assistance (39 percent), an increased IRR (30 percent), energy performance contracting (28 percent), or business case assistance (28 percent) would be effective.

Project management was a less popular suggestion, with only 1 in 10 thinking this would be effective. However, this question was focused on external project management, and the barriers of 'received report, but still being discussed' and 'inadequate internal resources' may point to some need for better internal project management.




**Key:** the full wording of the options as provided in the survey was as follows:

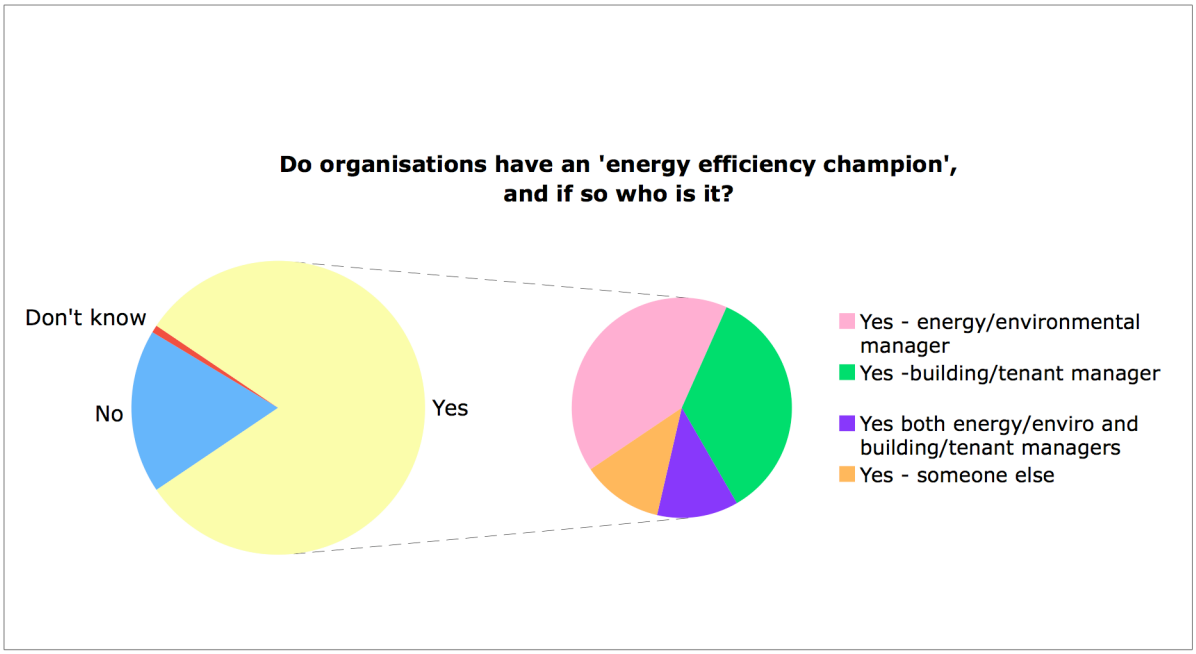
1. Financial incentives: discounts or rebates to reduce up-front costs
2. Technical assistance: advice on specifications, technology and appropriate engineering solutions
3. Increased IRR: increased internal rate of return
4. Energy Performance Contracting: external contractor makes the changes, covers up-front costs and recovers their investment from the energy savings made over an agreed period. After cost recovery, ongoing savings are yours
5. Business case assistance: advice on preparing an accurate business case or capital proposal
6. Project Management: management of the project by an external consultant

### 3.2.10 Existence of 'energy champions' within organisations

The majority of respondents (81 percent) indicated that they thought their organisation had at least one 'internal champion who is motivated to drive change towards energy efficiency', with only 18 per cent thinking there was no such person, and one person unsure.

Of those 64 respondents who did think their organisation had an energy efficiency champion, 41 per cent pointed to the energy/environmental manager, 34 per cent cited the

building/tenant manager, 12.5 per cent thought that both these people were 'champions', and 12.5 per cent thought that there was someone else who was a champion.[6]




### 3.2.11 Importance of energy efficiency within organisations

Respondents were asked to give their assessment of the importance of energy efficiency to their organisation, on a scale where 1= 'not important' and 5= 'essential'.

The results show that the majority of respondents thought energy efficiency was at least moderately important to their organisation. Almost no respondents ranked it less than 3 on the scale. Further, a large proportion of respondents clearly saw energy efficiency as very important to their organisation – almost three quarters ranked it as 4 or 5 on the scale.

Significantly, over 40 per cent of respondents gave energy efficiency the highest ranking possible – indicating that they thought energy efficiency was 'essential' to their organisation.

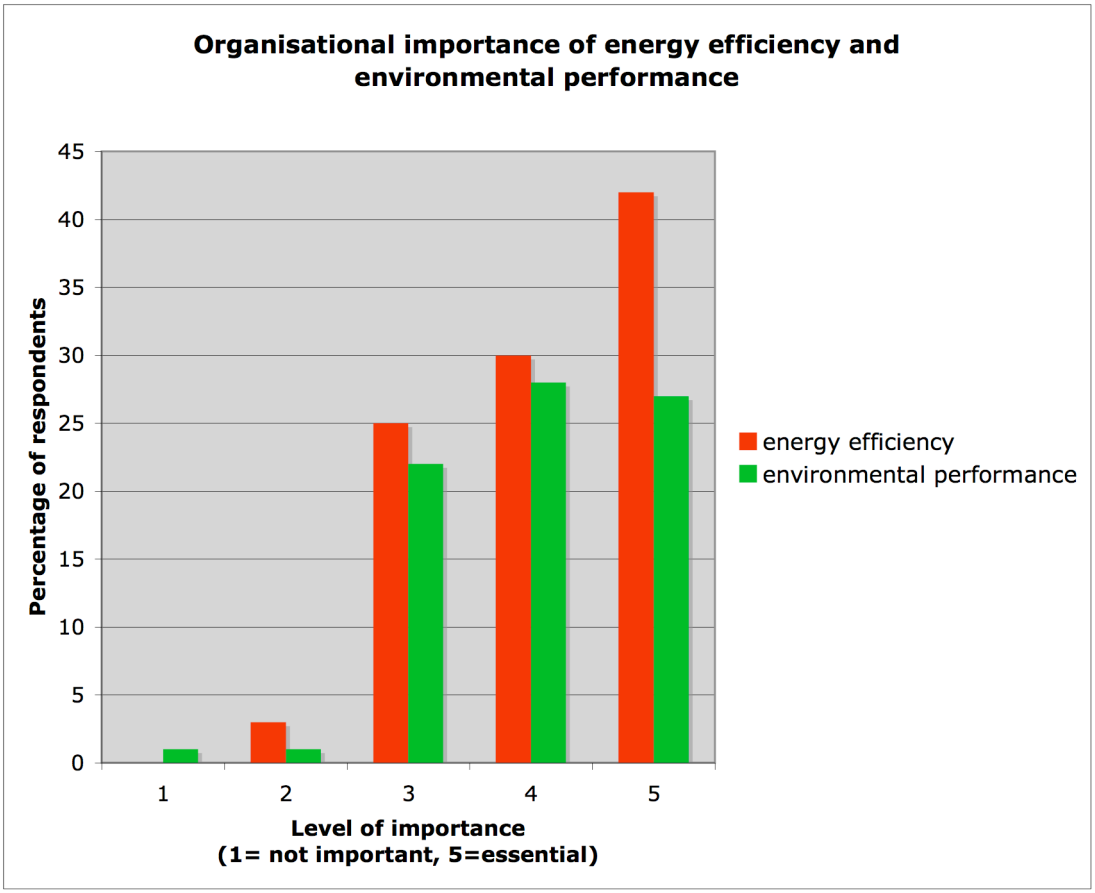
### 3.2.12 Importance of environmental performance generally within organisations

When asked to rank the importance of 'environmental performance generally' to their organisation, respondents considered it to be less important than energy efficiency, although

[6] People specified by respondents who answered 'other' were: the building owner (2 respondents), engineering department / chief engineer (2 respondents), 'various tenants', 'general manager', 'shop manager' and one slightly unclear answer that stated 'energy efficiency and environmental impact considered in project specifications' (perhaps implying the champion was the building designer and/ or owner).

it was still ranked highly overall, and there was a clear majority that considered it to be very important.

As the graph below shows, respondents were slightly less likely to rank general environmental performance as '3' or '4' on the importance scale, and were much less likely to think it was 'essential' (27 percent, compared to 42 per cent who ranked energy efficiency as essential). It appears that energy efficiency has a higher profile compared to other environmental performance categories for buildings such as water, waste or materials.



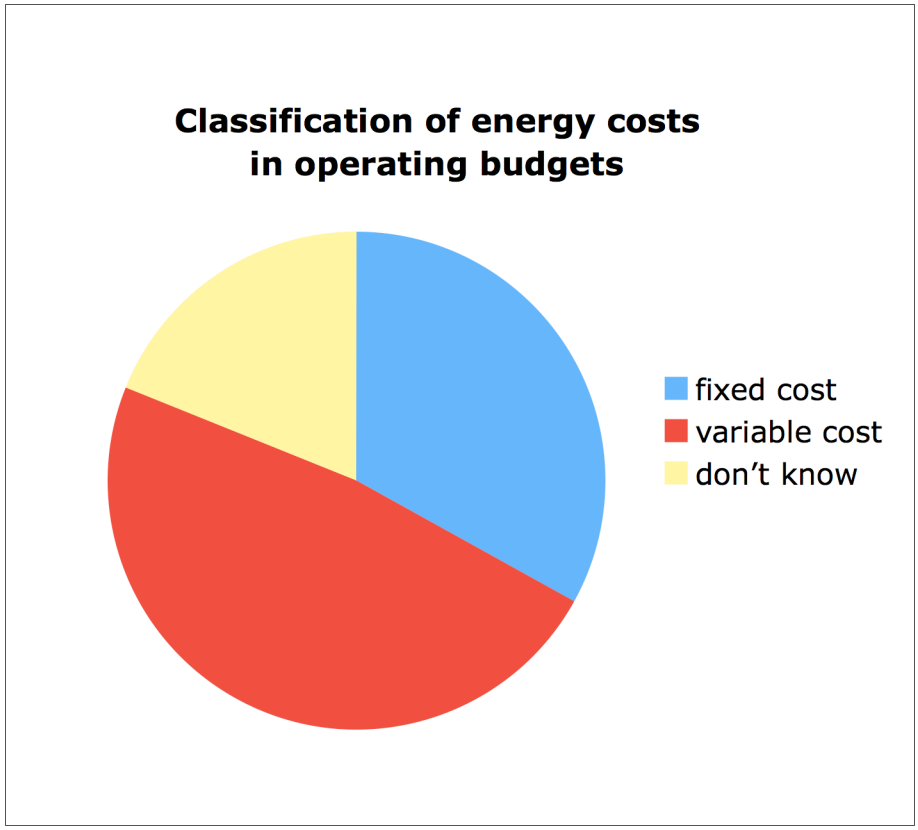

### 3.2.13 How organisations classify energy costs

Respondents were asked how their organisations classify energy costs when preparing their operating budget.

Results show that almost half the organisations classify energy as a variable cost, with only one third classifying it as a fixed cost. This split should be viewed with some caution however, as almost 1 in 5 respondents did not know how energy costs were classified.

When energy is considered as a fixed cost, there is generally less incentive to monitor and track energy use over time and capture possible savings. When energy is considered as a

variable cost, there tends to be greater scrutiny of usage trends over time (for example, this month as opposed to last month) and greater incentive to save energy.



# 4 Literature review

The purpose of this literature review is to provide a broader context, so that the findings of the survey can be interpreted and discussed in light of a range of Australian and international findings on the same topic. This literature review focuses on energy efficiency in buildings, with a particular focus on commercial buildings (office and retail). It examines:

- the range of policy approaches used to encourage energy efficiency
- commonly faced barriers to implementing energy efficiency improvements, and
- recommendations for future policy approaches.

The review is based on Australian literature, and includes some relevant international literature for comparison. Documents reviewed include research reports, policy discussion papers and policy submissions. See Appendix C for a bibliography of literature sources.

## *4.1 Background*

The Intergovernmental Panel on Climate Change (IPCC) estimates that:

> Global greenhouse gas emissions will have to be reduced by 60–70% compared with current levels before the end of the 21st century. Taking into account the needs of developing countries, this means that Australia's total greenhouse gas emissions may have to be reduced by at least 80% compared with current levels before the end of the 21st century.

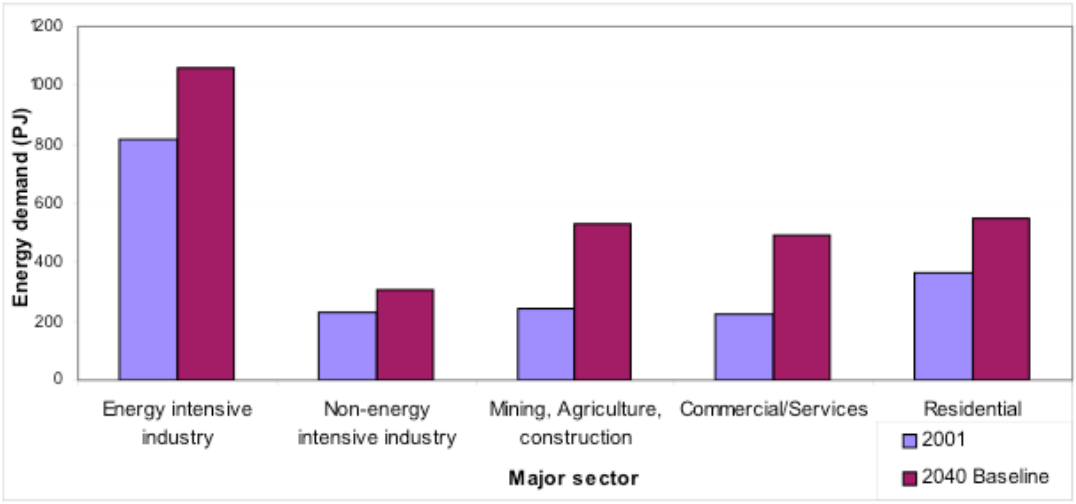
The commercial sector was responsible for around 9.5% of Australia's total greenhouse emissions in 2003.[7] Figures from 2001-02 indicate that the commercial sector accounted for around 13% of Australia's total (primary) energy consumption, whilst the residential sector accounted for around 16%. Energy consumption has grown at a faster rate in the commercial sector, at an average of 3.8% per year since 1973, compared to an average of 2% for the residential sector. Australian Bureau of Agriculture and Resource Economics (ABARE) projections for the next 15 years suggest that energy consumption in the commercial sector will continue to grow at a relatively high rate.

The National Framework for Energy Efficiency (NFEE) discussion paper reports that the growth of energy consumption in Australia's commercial sector can be attributed to structural change in the economy, resulting in an increased number of commercial

[7] Including electricity generation, transmission and distribution emissions, allocated to the commercial sector on the basis of the sector's share of electricity supplied. ABARE figures (Akmal et al. 2004) reprinted by the Australian Government Productivity Commission.

buildings, an increased proportion of air-conditioned buildings, and an increased use of electrical and electronic equipment.

Figure 1: Current and 2040 baseline projections of energy use in Australia by sector

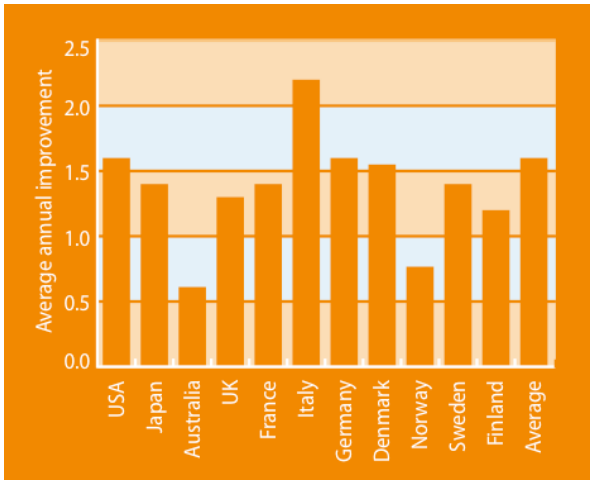



(Source: *A Clean Energy Future for Australia)*

## *4.2 Potential to improve energy efficiency*

International energy agency figures show that energy intensity has reduced in a range of OECD countries over the period 1973-1998, concluding that without these efficiency improvements, energy consumption would have been almost 50% higher. While Australia showed some improvement in energy efficiency, (by around 0.6% per annum) it is at the lower range for the countries studied.

Figure 2: Improvement in energy efficiency for 11 OECD countries 1973-1998

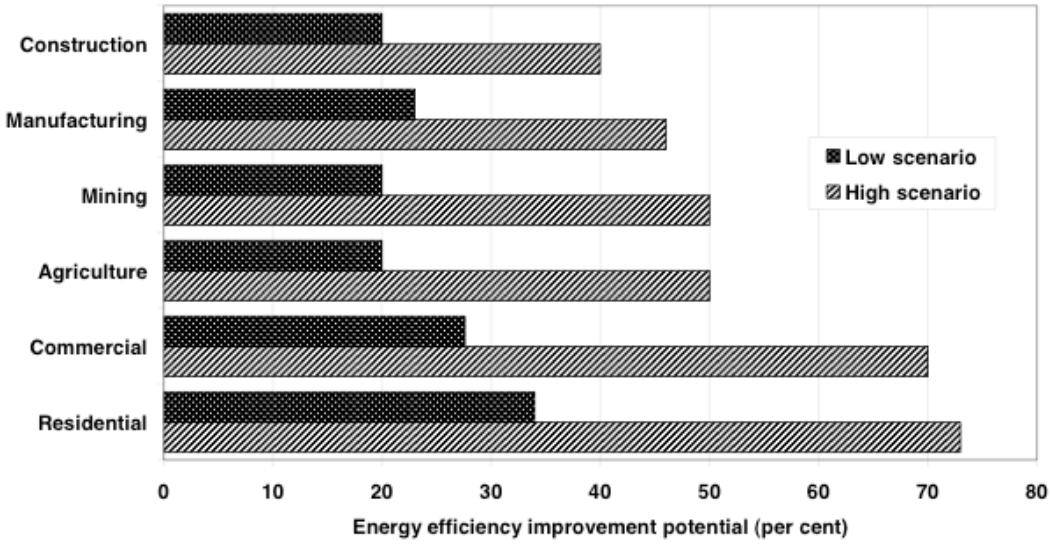



(Source: IEA, reprinted in *Energy Efficiency for Victoria: Action Plan*)

The NFEE discussion paper cites a significant gap between economically viable levels of energy efficiency and what the market is actually delivering. Whilst the range of energy efficiency programs and activities undertaken in Australia since the late 1980s have contributed to improvements in energy efficiency, the actual achievement is estimated to represent less than 20% of what is estimated to be economically beneficial.[8]

The graph below contains estimates of energy efficiency improvement potential for a range of different sectors. The low scenario is based on current commercially available technologies with an average four-year payback period. The high scenario is based on existing and emerging technologies with an average eight-year payback period.

Figure 3: Estimates of potential energy efficiency improvements




(Source: Sustainable Energy Authority Victoria (SEAV) – NFEE, reprinted by Australian Government Productivity Commission)

## 4.3 Prerequisites for energy efficiency

There is significant variation amongst commercial energy users in terms of activities and building types. This sector includes office-based businesses, retail shops (encompassing a wide range of variations from large supermarkets to boutique specialty stores), hotels, restaurants and many other variations. Therefore, the nature of energy use and the opportunities for improving energy efficiency vary considerably. However, the Australian CRC for Renewable Energy (ACRE) has identified the following pre-requisites for energy

[8] Based on achieving half of the low energy improvement scenario, which is implementation of current technologies with a four-year payback.

efficiency:

- Availability of/ access to energy efficient products and services
- Awareness by users that energy efficiency is an issue
- Willingness/ motivation to take action and give priority to energy efficiency
- Access to information and ability to apply it to a given situation
- Affordability
- Ability and or authority to make decisions regarding efficiency
- Feedback (learning from experience)
- Support and recognition

The NFEE discussion paper emphasizes that all levels of government, business, trade unions, community-based non-government organizations and individuals must play active roles in the transition to reduced energy use and greenhouse gas emissions.

Findings from the US report *Scenarios for a Clean Energy Future* indicate that:

> Minimum equipment efficiency standards, voluntary programs, and research and development are the three most important contributors to energy savings, with building codes, tax credits, and incentive programs generally playing a supporting role. Typically, 90 to 95% of the energy savings is attributable to these three types of programs.

## 4.4 Barriers to energy efficiency

### 4.4.1 Overview

A range of recent Australian studies and papers examine the barriers to achieving energy efficiency in the commercial, residential and industrial sectors. Many of these have been included in this literature review. The ACRE paper *Policy Options for Energy Efficiency in Australia* describes the following key barriers:

> Most energy users, manufacturers of energy-using equipment, builders, energy suppliers or government policy makers, do not see end-use energy efficiency as a major issue. Under these circumstances, policy makers are not willing or able to implement the far-reaching efforts that would meet users' preconditions for improving their energy efficiency. Energy prices exclude the cost of the environmental damage associated with energy use. Manufacturers and builders assume that features other than energy efficiency provide the most powerful motivators for buyers to select their products. And energy suppliers have little incentive to reduce the amount of energy they produce and/or sell.

**The key barriers to energy efficiency for commercial organisations can be summarised as:**

- Limited incentive, as energy is typically a small proportion of total costs
- Capital constraints and competing priorities for funds

- Aversion to risk and reluctance to shift from 'business as usual'
- Short-term thinking, and management structures that reinforce this
- Split incentives (for example, between those who make decisions about energy efficiency and those who pay energy bills)
- Lack of information, and the 'time cost' of finding the necessary information.

Supply-chain barriers to energy efficiency also affect commercial organisations (i.e. barriers faced by manufacturers, suppliers, builders and designers). These include a perceived lack of demand for energy efficiency by consumers and organisations, reluctance to depart from traditional approaches and aversion to the perceived risk associated with developing or implementing innovative new technologies. Further barriers include, the need to wait until a product has 'run its course' and paid off the initial investment (which slows innovation) and perverse engineering and design fee structures (based on a percentage of project capital costs, which provides no incentive to downsize plant or equipment).

Like the commercial sector, a key barrier to improving energy efficiency in the industrial sector is the inertia of current organisational attitudes and cultures. In the residential sector, key barriers identified in the literature are lack of sufficient relevant information for decision-making, consumer and market intermediary attitudes, and engrained behaviour with respect to energy use.

### 4.4.2 Specific barriers in relation to audit programs

Since this report for DMPP focuses on the implementation success of the audit program, it is worth examining what the literature revealed about specific barriers in relation to audit programs.

An ABARE study of Enterprise Energy Audit Program (EEAP) participants examined the relative importance of various barriers faced by firms in implementing energy efficiency. The EEAP program operated in Australia between 1991-1997 and offered subsidies for firms to conduct energy audits. The study found that:

> Where an audit recommendation was not implemented, the most likely cause was that the rate of return was too low. Other important constraints were investment risk, expertise of staff, and availability of finance.

Figure 4: Reasons why EEAP audit recommendations were not adopted

| *Reason for not implementing recommendation* | *Proportion agreeing or strongly agreeing with reason* |
|---|---|
| | % |
| Rate of return too low | 53 |
| Payback period too long | 45 |
| Auditor's assessment inaccurate | 38 |
| Energy efficiency often overlooked | 35 |
| Unclear how to implement | 28 |
| Investment irreversible | 28 |
| Finance unavailable | 20 |
| Investment too risky | 20 |
| Lack of staff with expertise | 17 |
| Not our decision | 13 |

(Source: Harris, Anderson and Shafron (1998), reprinted by Australian Government Productivity Commission)

The NFEE discussion paper found that the main barriers to transitioning to energy efficiency are neither technical or economic, but social and institutional. This is reinforced by the EE. The most common negative comment about the program was that auditors failed to understand they way firms operated.[9]

These Australian findings are reinforced by A US survey of more than 9000 energy efficiency audits, referenced in the Productivity Commission Inquiry[10]. The study found that:

> While 50 per cent of audit recommendations were not implemented by firms, 75 per cent of those decisions were made for legitimate economic reasons. The most significant factor reported was costs to the firm in other areas of its operation that were not taken into account by the energy auditors. Firms reported costs like unacceptable operating and personnel changes, risk or inconvenience to personnel, costs of installing new equipment including production halts and changes in product quality.

The definition of 'legitimate economic reasons' is important when interpreting these results, as legitimacy depends significantly on the investment criteria used. The following section on barriers includes a finding that unnecessarily high hurdle rates typically tend to be applied to investments in energy efficiency.

### 4.4.3 Detailed analysis of major barriers to energy efficiency

This section examines in further detail some of the key barriers to energy efficiency identified in the literature.

[9] (Harris, Anderson and Shafron 1998). Reprinted by the Australian Government Productivity Commission

[10] (Anderson and Newell 2002) Reprinted by the Australian Government Productivity Commission

**Energy prices do not reflect the true costs of energy production and use, sending skewed signals to energy users**

Energy pricing structures that do not reflect the 'external' costs of energy production and use, such as environmental damage, send skewed signals to energy users and result in the undervaluing of energy efficiency opportunities. As the discussion paper for the NFEE recommends:

> The environmental and social benefits of the efficient use of energy and the use of renewable sources of energy are large and should be reflected as far as possible in pricing and government funding.

**Energy is typically a small percentage of a firm's total operating costs, therefore energy efficiency is perceived as low priority**

For the average commercial business, energy costs are a small portion of total operating costs and tend to be perceived as external to core business. Energy costs amounted to less than 2% of the total costs faced by firms in Australia's commercial sector in 1998-99, as compared to 1.8-11.5% for the manufacturing sector, and around 2.7% for the residential sector[11].

**Energy efficiency's low priority can be compounded by constrained access to capital and competing demands for capital**

Access to capital (and the cost of capital) can be another constraint where energy efficiency is concerned. There are limits in relation to the capital available to any organisation, and energy efficiency needs to compete alongside other organisational priorities for potential funding. In the presence of other business priorities such as product quality, marketing, competitors actions and occupational health and safety, potential energy savings tend to be perceived as not worth the time or effort. The 2005 Productivity Commission Inquiry into the *Private Cost Effectiveness of Improving Energy Efficiency* found that:

> If improving energy efficiency comes at the cost of forgoing other more cost-effective opportunities (because of capital or labour constraints or because the projects are mutually exclusive alternatives), it would be rational for the firm to give energy efficiency a low priority.

However, it is important to note that assessment of priority is influenced by the investment criteria applied to energy efficiency, which both ACRE and the NFEE have found to be unnecessarily conservative at present.

[11] Australian Government Productivity Commission estimates from ABS. Residential data is for 2003.

**Split incentives between building owners/ managers and tenants are likely to limit the scope of energy efficiency upgrades to buildings**

Split incentives between those who make decisions about investment in energy equipment and those who pay energy bills have been identified as a significant barrier to achieving energy efficiency. In many cases, the benefits of energy efficiency do not accrue to the party that initiated them. In commercial buildings, split incentives commonly occur between the developer, the building owner and the tenant. This can lead to a focus on first or upfront costs instead of life cycle costs and may result in the non-adoption of what would have been a worthwhile investment.

**Many organisations do not integrate energy management with business planning**

As previously highlighted, many organisations perceive energy management as external to core business. The NFEE discussion paper found it 'apparent that some organisations don't even consider the potential significant gains to be achieved through energy efficiency in business planning activities'. Energetics (an energy service contractor) conducted a survey of clients and found that, of their clients with operating expenses greater than five million dollars a year, 84% did not have a dedicated energy management system.

**Aversion to risk and reluctance to depart from 'business as usual' can impede an organisation's implementation of energy efficiency**

Willingness to invest in energy efficiency is linked to corporate culture, management and attitudes to risk. Many organisations prefer the safety of 'business as usual' compared to the cost and risk of investing in new technologies and processes, particularly when it requires a significant change in approach. Even when energy efficiency is considered, a tendency to 'fit in' with historical budget allocations for energy efficiency can be a constraint to investing in new technologies and processes.

**Split incentives and poor integration within organisations discourages investment in energy efficiency**

Policies that link payment to recent performance (short term profitability) rather than longer-term performance can encourage managers to operate with short-term horizons. In this environment, projects with short paybacks will be preferred over those with longer paybacks, even if they have lower net present values. If incentives are not appropriately aligned, managers within different parts of an organisation may work to maximise their own unit's performance rather than work together to maximise the firm's overall profits.

Submissions to the Productivity Commission Inquiry gave examples of this misalignment of staff incentives and business outcomes, such as an energy efficiency project that was instigated by the CEO of an organisation and 'killed' by middle management who 'couldn't be bothered'. Conversely, there were examples of how energy efficiency benefits were easily 'sold' to organisations at the engineering level but difficult to translate up to senior decision making level.

**The time and effort associated with finding the information needed to make the right decision can be perceived as prohibitive**

The Productivity Commission Inquiry identified a range of information gaps regarding the various commercial building options and their cost. Energy users are not generally provided with sufficient feedback about energy use (lump sum bills provide no indication of where energy is used), which limits ability to optimise behaviour. Decision makers may lack the tools to quantify the cost and environmental benefits of energy efficiency measures. The lack of credible data for comparison was also identified as a barrier.

The 'transaction cost' of obtaining the information necessary to implement energy efficiency improvements can also be a significant barrier. As the NFEE discussion paper points out, "relevant information is not always available at the right time to the right people to enable informed energy efficiency choices to be made". Managers with limited time and resources may find the time and effort needed to source reliable information prohibitive and the 'opportunity cost' of their time better spent elsewhere. As the Productivity Commission Inquiry found:

> While individuals might not make ideal choices from the perspective of an outside observer, they may well be optimising something else that is just as important to them — such as the value of their time.

For organisations wanting to reduce their environmental impact, particularly small to medium enterprises, this can lead to a bias against demand management in favour of simply buying 'green' energy.

**Typical costing approaches can work against energy efficiency investments**

The costing approaches typically applied to energy efficiency investments can compromise outcomes. As the NFEE discussion paper found, "organisations appear to use a higher hurdle rate for energy efficiency investments than for other investments". In addition, utilities and investors in energy supply tend to operate with longer payback periods, leading to bias against demand-side investments.

The ACRE paper *Policy Options for Energy Efficiency in Australia* found that:

> Claims that only small savings are feasible appear to be based on an expectation of very rapid returns on investment (e.g. one or two year payback of total investment costs – equivalent to a tax free return of 50 to 100% per annum, far higher than most investors achieve), and incomplete analysis of savings potential.

These expectations for return on investment appear unnecessarily stringent, given that a 2003 financial analysis conducted for the Australian Building Codes Board recommended any investment in building energy attracting a rate of return of 7% or more as financially viable. This is largely due to the low risk associated with investment in making buildings energy efficient. The study found that:

> There are many situations where investments in energy efficiency should be regarded as virtually risk-less investments, [and at most] no more than half as risky as the average investment in productive assets by Australia's listed companies.

**Outdated building valuation techniques provide a disincentive for building owners to improve energy efficiency.**

The Green Building Council of Australia (GBCA) has found that the financial and property valuation sector does not appreciate the benefits of green buildings (of which energy efficiency is an important component) and therefore neither do prospective buyers. As a result, the benefits of energy efficient buildings are not being reflected in selling prices or lease rates.

**A general lack of industry skill is identified as a barrier by some stakeholders**

Many organisations lack easy internal or external access to the expertise or tools required to identify and implement energy efficiency opportunities. The GBCA's *Dollars and Sense of Green Buildings* recommends a national public education program on the benefits of green buildings and government support for industry professional development. The report cites OECD findings that "demand for green buildings increased where there was evidence of an educational program which identified the benefits". The NFEE discussion paper found that energy efficiency is not broadly integrated into the current curricula of TAFEs and universities, or the professional development programs of both professional and trade organisations. There is, however, some evidence that this is starting to change.

## 4.5 Opportunities to improve energy efficiency

This section discusses the various policy suggestions identified by the literature for improving the implementation of energy efficiency (with a focus on the commercial sector). Suggestions include applications of existing policy and proposals for new policies. There

was general agreement that a policy mix is required to reflect the complexity of the situation and the different circumstances of various groups that influence outcomes. Packages of different policy instruments (regulatory, incentive-based and educative) are likely to be most effective. The NFEE discussion paper also notes:

> The main barriers to making the transition (to reduced energy use and greenhouse gas emissions) are neither technical nor economic, but rather are social and institutional. An effective response requires governments to intervene to change the institutional structures and an economic system that fosters energy waste and excessive use of fossil fuels.

### 4.5.1 Criteria for good policy

In the ACRE policy options report, four criteria are identified for good practice policies to reduce greenhouse gas emissions, specifically those from energy. Policy should:

- Maximise economic efficiency and environmental protection (both in terms of climate change and ancillary environmental issues)
- Be politically feasible
- Minimise administrative complexity and overheads, and
- Either have limited or positive feedback effects on other policy areas (e.g., competition, trade, social welfare).

Applying those criteria, several areas of good practice solutions have been identified from IEA and OECD analyses in the energy and environmental field. These include:

- getting prices right, including abolition of subsidies to fossil fuels
- use of markets where possible, eg domestic emissions trading
- use of other mechanisms to address market failures, eg voluntary approaches, standards, government purchasing, incentives, and seed funding in research and development. cost-effectiveness must be a key criterion in design and implementation of these measures
- closer monitoring and assessment of emissions and of the impact of measures
- good institutions, requiring engagement of many ministries, different levels of government and other stakeholders from an early stage to build consensus and to take action, and
- international co-operation so that experiences can be shared and we can learn from each other.

### 4.5.2 Policy objectives and mechanisms

The ACRE report identified a number of important policy objectives in relation to achieving energy efficiency:

1. Facilitating efficient choices

2. Encouraging voluntary agreements

3. Improving products and buildings

4. Providing financial incentives

5. Government leading by example

6. Supporting research, demonstration and commercialisation programs

The following section outlines a range of policy recommendations that address each objective.

**Objective 1: Facilitating efficient choices**

#### Improving access to information

The NFEE discussion paper saw government's role in information provision as "ensuring that relevant, consistent and non-duplicative information (from awareness raising to detailed technical information) gets to the right people at the right time". The Productivity Commission Inquiry found that the case for governments providing general information was weakest where the users are large commercial and industrial organisations. This is because the information needs of such firms are usually specific and, to the extent that energy costs are significant, they have a stronger incentive to obtain their own information and have the resources to do so. This indicates that the best focus for governments could be householders and small to medium size businesses, however governments can facilitate access to information for large businesses, particularly those with limited incentive to save energy.

#### User feedback on energy use

A lack of user feedback was one of the barriers to energy efficiency identified in the literature. Suggestions include the use of sub-meters to monitor separate energy uses (eg. lighting, general power and HVAC in a commercial office tenancy) allowing users to better understand their energy use patterns and potential for savings. This would allow for a more

detailed breakdown of energy use and greenhouse emissions on commercial energy bills.

#### Product labelling (mandatory and voluntary)

The Productivity Commission Inquiry found evidence to suggest that consumers are paying more attention to appliance and vehicle labelling than they have in the past, and concluded that, "labelling has probably produced net social benefits". Australia has examples of mandatory labelling (such as the appliance energy labels for white goods) and voluntary labelling (such as the energy star labels for home electronics). The Productivity Commission Inquiry suggested that labeling is most appropriate where there is a wide spread in the range of energy efficiency performances of comparable appliances, where energy rating tests bear some resemblance to the way appliances are used, and where information failures are most pronounced. The NFEE discussion paper goes further and calls for the implementation of "national mandatory energy and greenhouse labeling for all appliances and equipment with the capacity to use more than 50 W of electricity or 5 MJ/hour of natural gas".

#### Building ratings (mandatory and voluntary)

There are two main Australian rating systems for commercial buildings, Green Star and the National Australian Built Environment Rating System (NABERS). They perform different tasks: Green Star measures the building's potential to reduce environmental impact (due to its design and features) and NABERS measures the actual operational performance of a building. Both systems integrate the Australian Building Greenhouse Rating (ABGR), which measures a building's actual annual greenhouse emissions. These tools were developed for voluntary use, however there is the potential to use ABGR to mandate minimum performance levels for new buildings, as has been done by some local government jurisdictions.

#### Disclosure of energy performance at point of sale

In the ACT, it is mandatory to disclose the Home Energy Rating (HERS) at the point of sale. The Home Energy Rating only simulates likely heating and cooling needs based on the attributes of the home. The Productivity Commission Inquiry was "not convinced that in its current form the ACT scheme produces net social benefits" because it adds to transaction costs and may not be effective in encouraging uptake of energy efficiency improvements. This is because energy costs are a very small cost of home ownership and other features will most likely have a far more important impact on house-purchasing decisions. Another problem is that the scheme currently only deals with likely space heating and cooling

energy, not other energy uses such as hot water and lighting. There are no equivalent mandatory requirements for commercial buildings, however the grade of commercial buildings (premium, A-grade, etc) is now linked to their ABGR or Green Star rating. Some voluntary mechanisms such as green leases encourage prospective tenants to ask for information about energy use when selecting commercial space.

#### Education

One of the barriers to energy efficiency identified by the GBCA and the NFEE is a lack of public education on the benefits of green buildings (including energy efficiency). They identified a need for public education and education targeted at decision makers in organisations. Education on the benefits of green building was also recommended for specific sectors including the property investment sector and the property management sector. Government support for improved property industry education at both formation level (TAFE, University) and professional development was also recommended. This is starting to happen to some extent in the property industry, with many professional and trade organisations starting to develop programs. These include residential building courses offered by the Master Builder's Association and the Housing Industry Association, Green Star courses (with a focus on commercial building types) offered by the GBCA, and seminars related to energy efficiency offered by a range of property industry professional bodies.

#### New valuation techniques

The Green Building Council has identified current building valuation methods as a disincentive for investment in green buildings. Current accounting methods are usually based on depreciation of original cost and do not account for the lower operating costs or higher capital value associated with green buildings. The GBCA found, " such approaches account for the often higher capital investment of green buildings but in effect ignore the resulting benefits to occupiers and on market value". The GBCA recommended that the following factors be incorporated into valuation:

- Life cycle costing and its effect on value
- Effect of lower building risk to capitalisation rates, discount rates and terminal yields
- Rental rates, lease structures, and growth in rents
- Lower operating costs and the net effect to the asset value
- Impact upon vacancy rates, tenant retention and lease incentives

- Cost of debt and equity
- Financial impact of 'soft' gains such as increased productivity, improved morale and lower absenteeism, and
- Financial impact of improved corporate image and marketing benefits.

Other mechanisms such as carbon trading and energy pricing also serve to facilitate efficient choices. For more information on these, see the section on 'financial incentives'

## Objective 2: Encouraging voluntary agreements

### Voluntary commitments

The Productivity Commission Inquiry found that voluntary partnership programs could be effective policy tools for promoting energy efficiency improvements. In this model participating firms voluntarily commit to invest in agreed measures, in return, the firm receives some assistance (though not usually cash subsidies) and the right to promote itself as an 'eco friendly' company. Examples of such programs include the Commonwealth government's Greenhouse Challenge, which forms partnerships with Australian companies to improve energy efficiency and reduce greenhouse emissions. At a State government level, some voluntary agreement programs involve building owners or tenants committing to achieve certain levels of emission reductions after undergoing an ABGR assessment. Similar programs have been developed by some Local governments, such as the 3CBDS Greenhouse Initiative and the Parramatta Greenhouse Leaders Project in New South Wales. Government can also encourage voluntary commitments through the provision of awards and by partnering with industry associations to promote energy efficiency among members.

### Audits

The barriers to implementation of energy efficiency audits have been identified in this literature review as primarily related to perceived low rates of return and high investment risk, and the inability of the auditor to take competing demands for capital within the organisation into account. This appears consistent with the findings of the DMPP survey, and highlights the need to integrate the audit process with a better understanding of how each business operates. The Scenarios for a Clean Energy Future report found that audits tend to be "constrained by lack of knowledge of the operating environment and lack of involvement of internal expertise". A 'one size fits all' approach to audit programs is not effective due to differences in organisational structure and practices. Recommendations to

improve the effectiveness of audits include a higher degree of involvement with a cross-section of the organisation's staff (the best way to understand issues across the organisation and generate ideas), and the integration of recommendations with normal business planning. Levels to examine include not only equipment and technical systems, but management systems also.

#### Performance contracting

Performance contracting refers to an agreement an organisation can make with an energy service company (ESCO) to supply an integrated package of services aimed at increasing energy efficiency. The package is likely to include an audit to identify energy saving opportunities, design and implementation of measures and post-implementation maintenance and support. A certain level of savings is generally guaranteed and compensation is tied to the realisation of those savings.

Performance contracting is an effective way to reduce the barriers of constrained capital and aversion to risk that may otherwise prevent organisations from implementing energy efficiency measures. As the Productivity Commission Inquiry found:

> Energy performance contracting can reduce… information and organisational barriers… Further, since the ESCO guarantees a certain level of savings, there is a redistribution of implementation risk away from the firm to the ESCO, which would arguably face a lower risk of project failure due to its technical expertise.

Some stakeholder submissions to the Productivity Commission recommended a role for government in facilitating the use of energy service companies.

#### Green Leases

A 'green lease' is a cooperative agreement between a tenant and landlord, whereby both parties commit to achieving certain environmental objectives with regard to the base building and tenancy. The Commonwealth government has developed a Green Lease Schedule for government operations as part of its 'Energy Efficiency in Government Operations' policy. Some private sector property owners and managers such as Investa Properties also use green leases in a voluntary capacity, as a way of differentiating their services to potential tenants.

## Objective 3: Improving products and buildings

### National objectives and targets

The Sustainable Cities report recommended that, "mechanisms need to be put in place for the Commonwealth, together with the States and Territories, to promote a 'blueprint' for our cities for the future". The Green Building Council of Australia agreed, and in its *Dollars and Sense of Green Buildings*, report recommended the development of key objectives and targets for the built environment. The NFEE discussion paper recommended separate targets for greenhouse gas reductions for Australia, each State and Territory, and each Local Government area. It suggested that each responsible level of Government be required to develop a publicly available strategic plan and action plan of implementation, and to report publicly on progress each year.

### Minimum energy performance standards

Mandatory minimum energy performance standards apply to some appliances such as refrigerators/freezers, air conditioners and electric storage hot water systems. The NFEE discussion paper recommends:

> national mandatory minimum energy and greenhouse performance standards for all appliances and equipment with the capacity to use more than 50 watt of electricity or 5 MJ/hour of natural gas.

The paper also recommends standards are made increasingly stringent every 5 years, publishing schedules for improvement 3-5 years ahead, so that manufacturers can plan. Further, it recommends requirements be based on the world's best practice, not just focused on removal of the worst products from the marketplace. The introduction of grants to manufacturers for re-tooling may help to lessen any industry resistance to such a policy.

### Building Code of Australia energy efficiency regulations

Energy efficiency regulations for commercial buildings have just been introduced to the Building Code of Australia (BCA), specifying a minimum level of performance for new buildings. The NFEE discussion paper has recommended mandatory minimum energy and greenhouse performance standards for all commercial buildings (new and existing), based on the Australian Building Greenhouse Rating Scheme. The paper suggests that building owners be given options to comply, including the use of Green Power and Renewable Energy Certificates (RECs) under MRET. It states:

> The minimum performance standards should initially include a 5-star requirement for new buildings including fit out, and a requirement for existing commercial buildings to be progressively improved to achieve 4-star rating.

#### Mandatory audits and reporting for large energy users

There are some instances of government requiring large energy users to achieve and report efficiency-related savings, such as the recently introduced NSW Energy Savings Action Plans. Firms must undertake an audit and are required to invest in projects that meet specified investment criteria (a three-year payback is the norm). The Productivity Commission Inquiry identified some difficulties with such schemes, such as the difficulty of establishing baselines for diverse user groups and measuring improvements, and the difficulty of verification for carbon trading purposes. It also found that:

> Even if the audit assessment is accurate — and the proposed investment passes normal profitability criteria — the regulator is not required to assess whether the firm has access to the capital required or if the project represents the best use of that capital.

It was also thought that the scheme may disadvantage already efficient firms and could encourage a delay of planned improvements. The Productivity Commission concluded that: "A better approach might be to attach (explicitly justified) environmental-performance conditions to the licences of such firms and allow them to choose the means of achieving those objectives." These recommendations should be interpreted in the context of the Inquiry's focus, which was the private cost effectiveness of energy efficiency. It did not examine cost effectiveness from a 'whole of society' approach.

### Objective 4: Providing financial incentives

#### Pricing to reflect the true cost of energy

The pricing of energy, which currently excludes 'externalities' such as social and environmental costs, was identified as a barrier to energy efficiency. As the Productivity Commission found:

> Since government intervention is warranted only when it produces net social benefits, the case for energy efficiency measures is likely to be strengthened if such net benefits are included and if they are significant.

Pricing that reflects the full costs of energy production and use, including environmental and social costs, would certainly provide a market incentive for increased energy efficiency.

#### Accelerated depreciation allowances for equipment

Currently, whilst building owners can claim 100 per cent tax deduction for maintenance and repairs, they can only claim depreciation for equipment upgrades or replacements. This provides a disincentive for energy efficiency upgrades of existing systems or installation of new, highly energy efficient systems. An adjustment to the Taxation Act that makes upgrading the energy efficiency of building equipment to 'best practice' equivalent to 'maintenance' would provide significant incentive to building owners.

#### Tax deductions and credits

In addition, there are many other ways of providing tax incentives for owners of existing buildings to improve energy efficiency. In *The Dollars and Sense of Green Buildings* report, the GBCA makes the following suggestions:

a) Tax deductions (offset against taxable income). The GBCA suggests that: *A special tax incentive applied for improving existing buildings' environmental attributes would be the catalyst for refurbishment activity that would reduce the impact of Australian city developments.* Examples include reduced GST payable for equipment that meets certain performance efficiencies and immediate tax write-off for purchase of certain high efficiency equipment.

b) Tax credits or rebates for expenditure on buildings that meet certain energy efficiency standards. Such an example is the New York Green Building Tax Credit program. Tax credits can benefit those in a tax loss situation, because there is the possibility of receiving a refund that would normally be carried forward.

c) Capital gains Tax reductions on the sale of properties that meet certain green building requirements. This would be an incentive for both investors and developers of green buildings.

d) Tax breaks for dividend returns to investors in green buildings. The GBCA suggests *Franking credits that increase net dividend returns for socially responsible investments which include green buildings should be offered as an incentive*.

#### Carbon trading

The Productivity Commission Inquiry found that whilst the private cost effectiveness of energy efficiency programs is often overstated, the real policy target is often the public benefits of greenhouse gas abatement. Carbon trading would allow these benefits to be

better factored in to decision-making and analysis. The GBCA suggests: "A national emissions trading scheme should be established which allows the property sector to accrue and trade carbon credits from energy efficiency and demand side abatement initiatives". This could be an extension of the NSW Greenhouse Gas Abatement Scheme. ACRE suggests that energy efficiency certificates could be used, based on the model of Renewable Energy Certificates being used to implement the Mandatory Renewable Energy Technology legislation.

#### Low interest loans

Precedents exist in the residential sector for reduced home loan interest rates for energy efficient homes. Energy performance contracting is currently a mechanism used to reduce the 'first cost' burden to an organisation of improving energy efficiency. Low interest loans (accessible to organisations and/or energy service contractors) for commercial building upgrades could provide a further incentive for improving building energy efficiency.

#### Planning incentives

The GBCA suggests a range of state and local planning incentives and concessions for new green buildings and major refurbishments. These include stamp duty discounts, land tax discounts, rates rebates, density bonuses, green offsets and transferable floor space schemes.

#### Transfer payments

Direct transfer payments to targeted groups or activities can help to overcome the barrier of split incentives. The GBCA recommends: *cost sharing support should be provided to developers who undertake strategies that reduce the impact upon or cost of surrounding infrastructure*. For example, government and industry could share the cost related to strategies at the building level that reduce infrastructure osts (which government and taxpayers ultimately have to pay for). The GBCA notes that:

> Currently, developers who seek to install on-site green facilities are still paying the full cost of infrastructure levies/ headworks charges, even though their initiatives are not placing a burden on public infrastructure.

The GBCA recommends utilities need to not only waive levies and headworks charges but also provide fiscal incentives to the installations.

## Objective 5: Government leading by example

### Improving efficiency of government-owned buildings

The NFEE discussion paper suggests separate targets be established for greenhouse gas reductions for the in-house operations of the Australian Government, each State and Territory Government, and each Local Government. This is already occurring in many jurisdictions, although not as part of such a comprehensive framework. The report also suggests mandatory public reporting of energy consumption and greenhouse gas emissions by all levels of government and associated public services.

### Procurement of energy efficient buildings, office space and equipment

Government has an opportunity to adopt minimum energy efficiency and greenhouse standards for the procurement of buildings and equipment. Many jurisdictions across different levels of government are already doing this. The GBCA suggests green building standards for government buildings and tenancies, and the use of life cycle cost accounting in decision-making (including tender contracts). The GBCA concludes that: *importantly, government departments need to move beyond a narrow focus on energy targets for their buildings and/or tenancies (to) holistic green building strategies that reduce the environmental impact of development*.

### In-house carbon levies

In the absence of a national carbon-trading scheme, the NFEE discussion paper suggests that government could introduce in-house carbon levies to fund emission reduction within government operations, and encourage or require adoption of such internal levies by participants in Greenhouse Challenge and other government programs. The NFEE states *Such an approach means that governments and businesses will start to see carbon price signals, but the money will stay within the government programs and businesses and can be used to fund actions that reduce emissions and in many cases repay rapidly the initial investments*.

## Objective 6: Supporting research, demonstration and commercialisation programs

### Funding

The NFEE discussion papers recommends that government increase funding for research, development and dissemination in regards to efficient energy use and renewable energy

technologies, socio-economic and policy aspects of energy efficiency, and the organisational and institutional changes required for dissemination of the technologies. Charges on energy use could create revenue for such programs.

#### Creating partnerships

Government can play a role in creating appropriate partnerships between government, business and the community to promote energy efficiency.

# 5 Conclusion

This conclusion reflects on the survey outcomes within the broader context of the literature review findings, and considers the implications for the Demand Management and Planning Project.

The literature review recommends a range of pre-requisites for encouraging energy efficiency in buildings. Some, such as:

- awareness by users that energy efficiency is an issue, and
- access to energy efficient products and services

appear to be satisfied as far as the surveyed DMPP customers were concerned. Of those who responded, a high proportion (over 70%) felt that energy efficiency was 'important' to 'essential'. However, some limitations to be aware of include the fact that 78% of the survey recipients did not respond (which could be partly because they see the issue as less important) and that 84% of respondents were building owners, so the tenant perspective may be under-represented. Energy tends to be a larger proportion of business costs for building owners than for the average tenant. However, as tenants have a significant impact on a building's energy use (being directly responsible for almost half the electricity use in a typical commercial building) it is important to ensure that tenants also value energy efficiency. None of the respondents identified lack of access to suppliers and installers of energy efficient products as a barrier, presumably because the audit process had helped to make these connections.

However, the survey indicated that some of the pre-requisites for encouraging energy efficiency identified in the literature are not fully satisfied. These include:

- affordability
- willingness/ motivation to take action and give priority to energy efficiency, and
- ability/ authority to make decisions regarding energy efficiency

Both the literature and the DMPP survey identify a number of barriers relating to the above, which fall mainly into the categories of 'limited financial incentive' and 'organisational barriers'. These are discussed in more detail below.

The implementation rate (of audit recommendations) among survey respondents was high, with only 11% not implementing any of the measures recommended. However, the reasons identified for 'not doing more to implement energy efficiency' provide some indication of

key barriers. The most commonly identified reason was 'received energy audit report, but still being discussed'. There could be many reasons for this, however financial and organisational barriers are likely to be involved. The second most commonly identified reason was 'too expensive/ does not satisfy audit criteria', which explicitly points to the cost barrier. This is reinforced by responses to the question on 'types of assistance considered likely to be effective', whereby 'financial assistance' was most commonly identified (by 70% of respondents) and 'increased return on investment' was the third most commonly identified (by 30% of respondents).

Another finding from the survey that points to the limited financial incentive within organisations is that at least one third (and possibly up to a half) of organisations classify energy as a fixed cost in their operating budgets. The implications of this are that in many organisations there are no expectations that energy costs will vary, and consequently no incentives for those with decision-making responsibilities to reduce costs in this area. This apparent lack of organisational interest in or focus on energy costs at a detailed level is also likely to mean that there are limited mechanisms in place to track or compare changes in energy use. For many organisations, it is likely that energy costs are viewed as too small a proportion of overall operating costs to merit this level of detailed focus and cost-reduction effort.

The survey results indicated that financial incentives are key, with 70% of respondents nominating 'financial assistance' and 30% nominating 'increased return on investment' as the type of assistance that would be effective in improving outcomes. This highlights a current market failure that government can address through the provision of direct payments (eg. grants for energy efficiency), financial incentives, and the promotion of mechanisms that reduce upfront costs such as energy performance contracting and low interest loans. This is a key area of focus in driving the mainstream adoption of energy efficiency.

Organisational barriers are implied by the responses to the survey. The reasons identified for 'not doing more to implement energy efficiency' include '...audit still being discussed' (the most commonly identified, by 43% of respondents), 'interested but have more urgent priorities' (the third most commonly identified, by about 20% of respondents) and 'inadequate internal resources' (the fourth most commonly identified, by 15% of respondents). It is also interesting to note that almost 20% of respondents did not answer this question, possibly because of poor communication channels or lack of clear accountability for implementing recommendations.

These findings on organisational barriers are reinforced by responses to the question on 'types of assistance considered likely to be effective', where 'technical assistance' was the second most common response (almost 40%) and more than a quarter identified 'energy performance contracting' (which removes some of the organisational risk and effort barriers) and 'business case assistance' as types of assistance they'd consider effective.

There are a few interesting apparent discrepancies between the survey and the literature reviewed. Split incentives between those who use energy and those who make decisions regarding energy efficiency (eg. between tenants and building owners) were identified by the literature as a considerable barrier to energy efficiency in buildings. This was not a prominent finding of the survey, with around 5% of respondents citing resistance from tenants or landlords as an issue. Note however that 84% of respondents were building owners, so the tenant perspective on landlord attitudes to energy efficiency was under-represented.

Whilst the literature review indicated that energy efficiency had limited appeal to organisations (as a small component of total business costs), the survey showed a high level of interest in energy efficiency. Over 70% of respondents felt that energy efficiency was 'important' or 'essential'. There are a few issues to consider when interpreting these results, which may help to explain the apparent discrepancy. The sample of survey recipients who provided a response (22%) would appear more likely to value energy efficiency than those who failed to respond. 84% of respondents were building owners, who are likely to value energy efficiency more than tenants simply because energy use tends to be a greater proportion of their overall costs. Another interpretation could be that the audit process helped to positively shift perceptions about the value of energy efficiency, which would be a very desirable outcome.

The remaining pre-requisites for energy efficiency identified by the literature are:

- access to information and ability to apply it to a given situation
- feedback (learning from experience), and
- support and recognition.

Lack of information appears to be less of a barrier in the audit context than in the more general context of the literature review (with less than 5% of survey respondents identifying this as an issue). However, 15% of respondents identified 'inadequate internal resources' (presumably including internal expertise) as a barrier and 'technical assistance' was the

second most common response to the question on 'types of assistance considered likely to be effective'.

Based on the literature review and the survey results, possible implications for DMPP include the need to focus on:

- Removing barriers associated with upfront cost and access to capital, using mechanisms that could include direct grants, energy performance contracting and low interest loans for energy efficiency improvements. Policy actions that would support this but are outside DMPP's immediate control include energy pricing that includes externalities, taxation reform and carbon trading.
- Encouraging less conservative investment criteria (eg. expectations for rate of return), by providing more 'business case' support and demonstrating the low risk of investments in energy efficiency (coupled with incentives that remove cost barriers as described above).
- Incorporating organisational change strategies more comprehensively into the audit program. The exact approach requires further consideration, and could possibly include methods to involve a cross-section of each organisation's staff in the audit process (including senior management and financial staff); providing support to management on the 'business case' (including relationship to other organisational priorities) and providing tailored 'hands on' implementation advice and technical support.

# Appendix A: On-line survey


## Department of Planning energy efficiency survey

**Statement of purpose and research ethics**

By completing this survey you are agreeing to participate in a study of organisational uptake of energy efficiency measures, being conducted by the Institute for Sustainable Futures (ISF) at the University of Technology, Sydney (UTS), on behalf of the Department of Planning.

The study seeks to find out whether your organisation has implemented any energy efficiency measures, what the barriers to energy efficiency are, and what can be done to support organisations to take up energy efficiency opportunities.

ISF and the Department of Planning are committed to ethical research practices. Information provided by you in this survey will be used in a report by ISF to the Department of Planning. The report, and any subsequent publications, will not identify you or your organisation in any way.

If you have any questions about the survey, please contact ISF Research Principal, Emma Partridge on (02) 9514 4954 or email: emma.partridge@uts.edu.au

Studies undertaken by the ISF have been approved in principle by the UTS Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research, please contact Ann Hobson, ISF Research and Publications Coordinator (02 9514 4974), or the UTS Ethics Committee through Research Ethics Officer, Susanna Davis (02 9514 1279). Complaints willl be treated in confidence and investigated fully and you will be informed of the outcome.

## Questions

**1. To begin please enter your email address:**

Your email address will be used only for the purposes of data matching and analysis in relation to this survey. It will not be stored or passed on to any third party.

**2. Which term best describes the building(s) for which you are responsible? (Pick one)**

- ○ Single-storey building
- ○ Multi-storey building
- ○ Single floor or tenancy within a multi-storey building
- ○ Multiple floors or tenancies within a multi-storey building
- ○ Multiple buildings on a single site
- ○ Multiple buildings across multiple sites

Other:

**3. Do you represent the owner of the building or the tenant?**

- ○ Owner
- ○ Tenant

**4. Which of the following categories best describes your site type? (pick one)**

- ○ Commercial
- ○ Retail
- ○ Industrial
- ○ Multi-residential
- ○ Hospitality

Other:

**5. Approximately how many employees are employed at this site?**

- ○ 1-19
- ○ 20-99
- ○ 100-199
- ○ 200+

**6. Did you receive the Demand Management and Planning report following the recent energy audit of your site?**

- ○ Yes
- ○ No

**7. Has your organisation implemented energy efficiency measures in any of the following areas? (tick all that apply)**

- ☐ Installed more efficient lighting
- ☐ Upgraded efficiency of HVAC (Heating Ventilation Air Conditioning)
- ☐ Installed more efficient drives or motors
- ☐ Fuel switching (purchased 'greener' energy)
- ☐ Power factor correction
- ☐ Load shifting (moved consumption out of peak periods)
- ☐ Standby generation
- ☐ Organisational process or policy improvements
- ☐ Other energy efficiency improvments
- ☐ **No, none of these measures implemented**

**8. What are the main reasons your organisation has not done more to improve energy efficiency? (tick the main reasons)**

- ☐ Interested but have more urgent priorities
- ☐ Too expensive/does not satisfy our investment criteria
- ☐ Lack of certainty about tenure (e.g. short lease, site may be sold)
- ☐ Resistance from landlord
- ☐ Resistance from tenant
- ☐ Inadequate internal resources
- ☐ Can't find a supplier/installer
- ☐ Don't have enough information
- ☐ Recieved energy audit report, but lack confidence in recommendations
- ☐ Received energy audit report but it is still being discussed
- ☐ Don't know

**9. Do you think the market for energy efficient technologies and services is able to meet the needs of your organisation?**

- ○ Yes
- ○ No

**10. If you answered 'No' to the previous question, could you please explain why not?**

**11. What kind of assistance would most encourage your organisation to take up energy efficiency measures?**

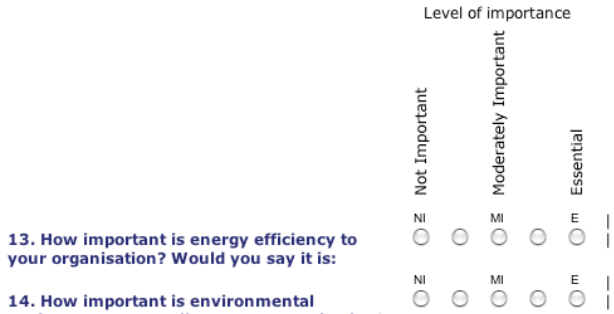
- ☐ Business case assistance (advice on preparing an accurate business case or capital proposal)
- ☐ Technical assistance (advice on specifications, technology and appropriate engineering solutions)
- ☐ Project Management (management of the project by an external consultant)
- ☐ Energy Performance Contracting (external contractor makes the changes, covers up-front costs and recovers their investment from the energy savings made over an agreed period. After cost recovery, ongoing savings are yours).
- ☐ Financial incentives (discounts or rebates to reduce up-front costs)
- ☐ An increased IRR (Internal Rate of Return)
- ☐ Don't know

Other:

**12. Would you say your organisation has an internal champion who is motivated to drive change towards energy efficiency? (you can include yourself!)**

- ☐ No
- ☐ Yes, energy/environmemental manager
- ☐ Yes, building/tenant manager

Other:




**15. How does your organisation classify energy costs when preparing its operating budget?**

- Fixed cost
- Variable cost
- Don't know

Finish > Page 1 of 1

That's the end of the survey. Thank you for your time.

# Appendix B: Text of email sent to DMPP customers

**Email subject:** Dept of Planning energy audit: follow-up survey

**Email text:**

Dear colleague,

Recently the NSW Department of Planning conducted an energy audit of your site to identify ways to improve energy efficiency and reduce peak demand.

The Department is now conducting a follow-up survey, and requests your assistance.

We would very much appreciate it if you could complete the short online survey, by clicking on the link below:

http://surveys.uts.edu.au/index.cfm?surveyid=2212

The survey is simple and user-friendly, and should take you only 5-10 minutes. It is online until 5pm on Friday 24 November only, so please complete it before this date.

(if the link above doesn't work, simply copy and paste this address into your internet browser address bar)

The study seeks to find out whether your organisation has implemented any energy efficiency measures, what the barriers to energy efficiency are, and what else can be done to support organisations to take up energy efficiency opportunities. The results will be used to plan future energy efficiency and peak demand reduction strategies. Your feedback will help the Department respond more effectively to the needs of the organisations it works with.

The Institute for Sustainable Futures at the University of Technology, Sydney has been commissioned to conduct this survey on behalf of the Department of Planning.

**Why you have received this email**

You have been sent this email because you are the contact person listed for the recent energy audit of your site. If you did not receive the audit report, or would like another copy, please contact Chris Tully at the Demand Management and Planning Project on (02) 9200 2203 or email: chris.tully@planning.nsw.gov.au

If you passed the report on to someone else, please forward this email to that person. Please copy ('cc') your email to: isf@uts.edu.au

# Appendix C: Literature review references

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