



## Building Retrofit Toolkit – scoping study

Developing the energy efficiency business skills of participants in mid-tier commercial office ownership, management, operation and occupation

FINAL REPORT

Prepared by the Energy Efficiency Council for the NSW Office of Environment and Heritage



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## Executive Summary

In recent years, high energy efficiency performance has become a ‘ticket to play’ in many sectors of the commercial office property market – particularly those larger office buildings occupied by large corporate and government tenants.

However there is a significant proportion of the commercial office sector that still face significant barriers to realising these energy savings and the associated benefits. These buildings tend to be the B, C and D-grade<sup>1</sup> buildings commonly defined as the ‘mid-tier’.

With as much as 80% the 64 million square metres of commercial office space in Australia classified as mid-tier<sup>2</sup>, the scale of unrealised energy efficiency opportunity is enormous.

The Energy Efficiency Council (EEC) and Property Council of Australia (PCA) have long recognised this opportunity and sought to ensure actors in mid-tier commercial office ownership, management, operation and occupation have the necessary energy efficiency business skills to unlock this opportunity.

With the support of the NSW Office of Environment and Heritage (OEH), the EEC and PCA undertook this scoping study as the first stage in connecting mid-tier actors with the necessary information, tools and support to grow these energy efficiency business skills.

There are a range of organisations working hard to lift the energy efficiency performance of mid-tier office buildings and we were able to benefit from their knowledge and experience.

Our work was integrated with the recently released *Mid-tier commercial office buildings in Australia: A national pathway to improving energy productivity*<sup>3</sup> (‘Mid-tier National Pathway’), delivering against action item 1.3. We have integrated the majority of the research and outreach actions of the Mid-tier National Pathway into our recommendations (Appendix 3), providing a pathway to delivery.

We know that mid-tier building owners are diverse in their size, business structure, investment strategy, risk appetite and understanding of energy efficiency benefits and opportunities. That means it is critical that, as we seek to assist mid-tier building owners unlock energy efficiency benefits, we recognise and respond to these differences.

However a bigger challenge is connecting with our target audience. There have been many attempts to engage with this notoriously challenging sector and it is the general consensus of those we consulted that a replicable, expandable and sustainable method of doing so has yet to be realised.

Finding the right pathways to engage with mid-tier actors is a critical first step in wholesale market transformation; there is very little likelihood of success in a one-size-fits-all approach and no one organisation is in a position to deliver all essential elements.

Through research and widespread engagement, under the guidance of a multi-stakeholder project Steering Committee, the scoping study has established the need to move beyond the development and promotion of a best practice ‘toolkit’ to a tailored, targeted connection initiative.

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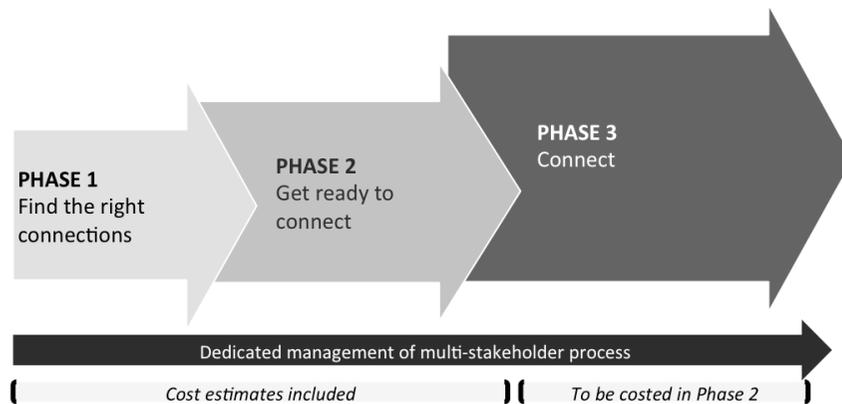
<sup>1</sup> As defined by the Property Council of Australia Guide to Office Building Quality  
<sup>2</sup> Green Building Council of Australia (2015) Mid-tier commercial office buildings in Australia: A national pathway to improving energy productivity

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<sup>3</sup> GBCA (2015)

Our recommendations provide the structure and approach for a phased, comprehensive project that:

- Consolidates and coordinates effort between industry bodies, local governments, states and the Commonwealth
- Introduces clarity and consistency in messaging and terminology, while better targeting existing information to particular actors in the mid tier
- Develops critical missing resources that build the confidence of decision makers to procure energy efficiency services and support a high quality energy efficiency outcome
- Lays the foundation for a widespread, effective effort to improve mid-tier energy performance.



The key tasks, timing and costs for a five-year implementation program have been set out in detail herein and can be summarised as follows. Deployment cost estimates have not been included as developing these would be part of the detailed design process in Phase 2.

<b>PHASE 1</b> <b>Find the right connections</b>	<ul style="list-style-type: none"> <li>• Further understanding the mid-tier to inform the development of targeted materials and a deployment plan:               <ol style="list-style-type: none"> <li>1. <i>Physical Condition</i> - number, size, grade, location, ownership structure, management approach, tenant profile, energy performance and equipment condition</li> <li>2. <i>Human Condition</i> - identify the most influential pathways to engagement with building owners and other intermediaries and information needs</li> </ol> </li> </ul>	YR1	\$250,000
<b>PHASE 2</b> <b>Get ready to connect</b>	<ul style="list-style-type: none"> <li>• Refinement of existing materials and development of new based on confirmed information needs</li> <li>• Establishment of the information clearinghouse with existing materials</li> <li>• Development of an informed deployment plan based on identified trusted sources of information</li> </ul>	YR2 YR 3 (part)	\$335,000 \$205,000
<b>PHASE 3</b> <b>Connect</b>	<ul style="list-style-type: none"> <li>• Ongoing maintenance and refinement of information clearinghouse</li> <li>• Targeted deployment based on deployment plan. These costs have yet to be estimated and are excluded from the budget</li> </ul>	YR 3 (part) and YR 4 YR 5	\$95,000 \$95,000 Excludes deployment costs
<b>TOTAL</b>			<b>\$980,000</b>

There is significant scope to establish the respective roles of this proposed program and the Mid-tier National Pathway. Potentially, this project could be a delivery vehicle for the information, tools and outreach components proposed in the Mid-Tier National Pathway, but will not cover the regulatory measures and non-energy related research elements of the Mid-Tier National Pathway.

While an integrated approach is recommended, many of the recommended elements could be progressed immediately for inclusion in the overarching framework once all stakeholders agree funding and delivery mechanisms.

## 1 Project rationale and approach

### 1.1 The opportunity

Australia's commercial buildings house a range of activities, including offices, retail, cafes/restaurants, warehousing, education, accommodation, health services and a range of other uses<sup>4</sup> and account for roughly 10 per cent of overall energy consumption in Australia<sup>5</sup>.

Standalone office buildings, in turn, account for about a quarter of that energy consumption by commercial buildings<sup>6</sup>.

In recent years, high energy efficiency performance has become a 'ticket to play' in many sectors of the commercial office property market – particularly those larger office buildings occupied by large corporate and government tenants. For example, the members of the City of Sydney' Better Buildings Partnership – primarily the large property institutions - recently reported 27 per cent energy savings from 2006 levels<sup>7</sup>.

However there is a significant proportion of the commercial office sector that still face significant barriers to realising these energy savings and the associated benefits. These buildings tend to be the B, C and D-grade<sup>8</sup> buildings commonly defined as the 'mid-tier'.

Most commercial buildings can reduce their energy use by 20 to 50 per cent with a return on investment of over 20 per cent, with the precise saving varying from building to building<sup>9</sup>.

Results from Sustainability Victoria's recent mid-tier focussed Energy Efficient Office Buildings (EEOB) program show an average 28 per cent reduction in energy use in less than 3 years simple payback. The opportunity for building owners to reduce energy outgoings and strengthen their bottom line through energy efficiency is significant.

Energy efficiency also brings with it a range of other powerful benefits to owners, occupants and the broader economy including increased asset values, health and productivity improvements for occupants and job growth driven through office energy retrofitting<sup>10</sup>.

Saving energy also reduces the need for investment in costly new generation capacity and network infrastructure. These savings are passed on to all electricity consumers through lower pressure on bill price rises<sup>11</sup>.

The scale of unrealised opportunity is enormous. In Australia, it is estimated that as much as 80% the 64 million square metres of commercial office space could be classified as mid-tier<sup>12</sup>. These mid-tier office buildings are there in our CBDs and

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<sup>4</sup> ASBEC, 2008, p7.

<sup>5</sup> ClimateWorks Australia, Tracking Towards a Low Carbon Economy: 4. Buildings, Melbourne, VIC, 2013.

<sup>6</sup> Pitt&sherry, Baseline Energy Consumption and Greenhouse Gas Emissions in Commercial Buildings in Australia – Part 1 – Report, Australia, 2012

<sup>7</sup> City of Sydney (2015) Draft Energy Efficiency Master Plan, <http://sydneyoursay.com.au/energy-efficiency-master-plan>, pg 6

<sup>8</sup> As defined by the Property Council of Australia Guide to Office Building Quality

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<sup>9</sup> ClimateWorks (2010) Low Carbon Growth Plan for Australia

<[http://climateworks.com.au/sites/default/files/documents/publications/climateworks\\_lcgpa\\_australia\\_full\\_report\\_mar2010.pdf](http://climateworks.com.au/sites/default/files/documents/publications/climateworks_lcgpa_australia_full_report_mar2010.pdf)>

<sup>10</sup> ASBEC/ClimateWorks (2016) Low Carbon High Performance (embargoed)

<sup>11</sup> NSW Government (2015) Review of the NSW Energy Savings Scheme Part 2: Options Paper

<sup>12</sup> Mid-tier commercial office buildings in Australia: A national pathway to improving energy productivity November 2015

fringe areas of major cities, in suburban centres and in regional towns right across Australia.

Australia's buildings hold the potential to deliver at least half of the national energy productivity target and around one quarter of the national emissions reduction target by 2030<sup>13</sup>. Connecting with the mid-tier to drive significant improvements in energy performance will be critical to the whole sector reaching its full potential.

## 1.2 Our approach

The aim of this scoping study was to successfully design a process to connect the actors in mid-tier commercial office ownership, management, operation and occupation with the information, tools and support needed to boost their energy efficiency business skills. To do this we knew it would be essential to:

- Understand the different information needs of the various actors in a building energy upgrade process
- Assess the suitability of currently available resources to meet those information needs including, identifying any gaps
- Connect the different actors with quality, respected sources of information
- Collaborate with others also working to improve the energy efficiency performance of the mid-tier sector.

Through research and widespread engagement, under the guidance of a multi-stakeholder project Steering Committee, the scoping study has established the information needs of mid-tier owners and other actors and identified gaps in style and content of currently available materials.

Our recommendations provide the structure and approach for a phased, comprehensive project that:

- Consolidates and coordinates effort between industry bodies, local governments, states and the Commonwealth
- Introduces clarity and consistency in messaging and terminology, while better targeting existing information to particular actors in the mid tier
- Develops critical missing resources that build the confidence of decision makers to procure energy efficiency services and support a high quality energy efficiency outcome.
- Lays the foundation for a widespread, effective effort to improve mid-tier energy performance.

### 1.2.1 Project leaders

The scoping study was lead by the EEC, the peak body for energy efficiency, cogeneration and demand management in Australia. The EEC is trusted by its members to represent the energy efficiency industry and represents the collective knowledge of the sector, making it uniquely placed to lead the development of accurate and relevant information on mid-tier energy efficiency.

The EEC's primary project partner, the PCA, is the leading advocate for Australia's property industry. The PCA's knowledge of the sectors' operating practices, issues and challenges was a valuable project input and their strong support significantly enhances the credibility of the outcomes and any future resources.

The OEH is committed to building the capacity for energy efficiency across the NSW economy and provided the funding for the EEC and PCA to undertake the scoping study.

### 1.2.2 Project Steering Committee

The scoping study was overseen by a multi-stakeholder Steering Committee (Table 1). Participants provided critical details on their own experiences working with the mid-tier, insight to property ownership and management and a deep understanding of approaches to building energy upgrades.

<sup>13</sup> ASBEC/ClimateWorks (2016) Low Carbon High Performance (embargoed)

### 1.2.3 Other key participants

There are a range of organisations are working hard to lift the energy efficiency performance of mid-tier office buildings. In 2015, the Green Building Council of Australia (GBCA), with support from the Commonwealth Department of Industry, convened over 50 industry stakeholders to develop the *Mid-tier commercial office buildings in Australia: A national pathway to improving energy productivity*<sup>14</sup> ('Mid-tier National Pathway').

The Mid-tier National Pathway aims to deliver the mid-tier commercial office building sector as 'an exemplar for energy efficiency and greenhouse gas emissions reduction' and the planned actions and initiatives. The action plan includes a range of initiatives intended to act as targeted levers on the different owners within the market.

As the project planning for this scoping study was well underway, it was possible to integrate this work as a key action item of the Mid-tier National Pathway (GBCA 1.3). Throughout the scoping study, we worked closely with the GBCA and other industry stakeholders to ensure shared learning, and aligned outcomes.

We have integrated the majority of the research and outreach actions of the Mid-tier National Pathway into our recommendations (Appendix 3), providing a pathway to delivery. There is also the potential to bring the work of all groups together with the support of the dedicated program management we recommend.

We also undertook targeted one-on-one interviews with key experts and stakeholders to ensure that their views were taken into consideration.

Table 1: Project Steering Committee members

Name	Representing
Matthew Cross (Co-chair)	Property Council of Australia
Cris Hickey (alternate Alice Cahill)	NSW Office of Environment and Heritage
Anthony Wright (alternate Jamie Wallis)	Sustainability Victoria
Caoimhin Ardren	Energy Action Ltd (Energy Efficiency Services Specialist)
Scott Armstrong	Local Government Super (Property Owner Specialist)
Matt Clark (Co-chair)	Energy Efficiency Council
Mark Matthews	City of Sydney

<sup>14</sup> Green Building Council of Australia (2015) *Mid-tier commercial office buildings in Australia: A national pathway to improving energy productivity*

## 2 Who are the mid-tier?

### 2.1 The buildings

The recently released *Mid-tier commercial office buildings in Australia: A national pathway to improving energy productivity*<sup>15</sup> synthesises much of the recent effort to improve the energy efficiency of Australia's mid-tier sector and identified the 'typical' characteristics of a mid-tier office building (Table 2).

Mid-tier office buildings are all the non-Premium or A-grade office buildings - that is, all B, C, and D-grade quality assets - as defined by the PCA Guide to Office Building Quality<sup>16</sup>.

They tend to be smaller than Premium or A-grade, generally under 10,000 square metres right down to very small office buildings under 500 square metres. This size range as well as the number of other defining parameters allows for a very wide range of variation in mid-tier buildings.

There are pockets of deep understanding of the size, grade, location, energy performance and equipment condition of Australia's mid-tier office building stock. The City of Sydney and City of Melbourne have built up a very good understanding of the profile the buildings within their jurisdictions and the 2013 Davis Langdon report, *The Next Wave: Retrofitting Victoria's office buildings*<sup>17</sup>, commissioned by Sustainability Victoria provides comprehensive data on the Victorian mid-tier sector.

**Table 2: Typical characteristics of a 'mid-tier' office building**

<p>Mid-tier office buildings generally have the following characteristics:</p> <ul style="list-style-type: none"> <li>Smaller buildings, generally under 10,000 square metres</li> <li>A diverse ownership profile (secondary mid-tier, private, family-owned, strata titled, government, foreign)</li> <li>A lower level of energy efficiency than premium or A-Grade buildings</li> <li>Generally older, built before 2000</li> <li>Older HVAC plant and lighting. HVAC is likely to be the original system (25+ years old) with zero or minimal controls and lighting tends to be T8 magnetic ballast fluorescent tubes</li> <li>Where there is HVAC, it is often either a mix of central plant or individual package/ split system units</li> <li>Some have natural ventilation (operable windows) so the base building can be energy efficient by default</li> <li>A small proportion have NABERS ratings, mostly triggered by Commercial Building Disclosure</li> <li>Typically higher vacancy rates than premium and A-grade assets</li> <li>A mixture of smaller offices, with mainly small and medium enterprise (SME) tenants</li> <li>Shorter lease terms than premium and A-grade assets</li> <li>Less rent per square metre</li> <li>Generally no on-site dedicated team for property/facilities management</li> <li>Other terms commonly used to describe this class of buildings includes 'secondary' or 'sub-prime'.</li> </ul>
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However this level of knowledge is unusual and there is not presently a complete national picture to this level of detail to inform a targeted deployment strategy. Improved data in this area would allow for better identification of energy upgrade opportunities, which some experts believe is in buildings 2,000 – 6,000 square meters, and critical decision making points. For example, many of the buildings constructed in the 1960's, 70's and 80's are coming up to end of life for original equipment, a significant trigger for action.

<sup>15</sup> Green Building Council of Australia (2015) *Mid-tier commercial office buildings in Australia: A national pathway to improving energy productivity*

<sup>16</sup> Property Council of Australia (2012) *Guide to Office Building Quality*

<sup>17</sup> Davis Langdon, *The Next Wave: Retro-greening Victoria's office Buildings*, 2013

For example it may be more effective to focus on a particular subset of the mid-tier market defined by size or age based on a better understanding of the opportunity across the whole mid-tier.

The PCA Office Market Database<sup>18</sup>, the Cityscope Commercial Property Information database<sup>19</sup> and the NABERS<sup>20</sup> program may provide much of the necessary data, but a dedicated exercise is required to collate and critique available data and address any gaps.

#### RECOMMENDATION

B1-1. Conduct further research into the number, size, grade, location, ownership structure, management approach, tenant profile, energy performance and equipment condition of mid-tier commercial buildings in Australia (*Physical Condition*)

It is also important to recognise that mid-tier office buildings are different to premium and A-Grade buildings and have different tuning and retrofit opportunities. Reflecting this will need to be a priority in developing resources to support energy upgrades in the mid-tier.

## 2.2 The owners

Mid-tier building owners are diverse in their size, business structure, investment strategy, risk appetite and understanding of energy efficiency benefits and opportunities. Herein lies one of the biggest challenges in wholesale market transformation. There simply is no one size fits all approach.

<sup>18</sup>[https://www.propertycouncil.com.au/Web/Events\\_\\_\\_Services/Research\\_Services/OMR\\_About.aspx](https://www.propertycouncil.com.au/Web/Events___Services/Research_Services/OMR_About.aspx)

<sup>19</sup> <http://www.corelogic.com.au/products/cityscope>

<sup>20</sup> <http://www.nabers.gov.au>

The City of Sydney analysed owners by ownership structure, organisational purpose, sustainability resourcing and the value of assets under management to arrive at six distinct groups of commercial building owners (Table 3)<sup>21</sup>.

Table 3: City of Sydney classification of commercial building owners

Segment	Description
Property institutions	Major property institutions, with five billion dollars in assets or more. Typically listed with direct assets, funds and development operations. Sustainability manager or team running a sustainability or responsible investment program at the corporate and asset levels.
Property groups	Smaller property groups with circa \$500M to \$5B in assets An organisational structure and a brand. Majority have no full time sustainability manager. Unlikely to have a structured corporate sustainability program Basic asset-level energy/environmental performance program is common.
Private landlords	Private landlords with no organisational structure or brand. Often with trust structures. No sustainability manager, staff generally have no expertise in sustainability or energy efficiency at all.
Government	Owned and (sometimes) occupied by State & Federal government.
Corporate	Owned and occupied by medium and large corporates.
Foreign	Often investors using a local investment manager (an Australian property group). In several cases the size of their real estate business is unknown.

Other segmentation exercises, such as those undertaken for the Mid-tier National Pathway, have generally arrived at very similar categorisations, but with some refinements.

<sup>21</sup> Courtesy City of Sydney

Property institutions and property groups are grouped together and referred to as 'Corporates' as distinct from the City of Sydney's identified owner-occupying corporate organisations. Private landlords can also be considered to include private investors, property syndicates, owners corporations and legacy family owners.

The classification is important for attributing general motivations for energy efficiency, however the behaviours are generalisations. There is a small group of innovative mid tier owners across the ownership types forging ahead with building energy improvements, often with the support of 'pilot' government programs and incentives. They are receiving much deserved recognition in awards and as case studies to demonstrate to others of what is possible.

As outlined in the widely accepted '*Rogers Diffusion of Innovations Theory*' approach, 'early adopter' owners benefit from access to tools to assist in change and the 'early majority' will also make use of these tools, supported by solid proof of benefits.

Our goal is to provide the readily accessible, well-targeted mid-tier building energy upgrade information, tools and facilitation needed by the 'early adopter' and 'early majority' owners and drive significant, wide-spread improvements in energy efficiency in the sector.

### 2.3 Supporting players

**Tenants of mid-tier office buildings:** the potential for vacancy remains one of the greatest motivators of building owners. Informing mid-tier tenants on the multiple benefits of a more energy efficient building (including health and productivity improvements), may result in pressure on building owners to undertake retrofits.

**Local Governments, State and Federal Government agencies, industry bodies and other intermediaries:** A number of local governments, government agencies, industry bodies and other parties, such as regional economic

development associations, have close relationships with mid-tier building owners and are motivated to help these building owners improve the energy performance of their buildings.

**Property service providers:** this can include the likes of property managing agents, leasing agents, valuation specialists, facility managers, building consultants and building contractors and energy efficiency experts. They all have a role to play in improving the energy performance of a building.

**Other business advisors that help building owners make decisions:** this can include accountants and lawyers who already serve as a trusted source of business information to building owners.

### 2.4 Making the connection

The different types of ownership structures and roles of other actors in building ownership, management, operation and occupations are relatively well understood. What is less known, and proving to be an on-going challenge is how to connect with the building owners.

Our research and consultation with those seeking to engage with the mid-tier owners has found that supporting players are likely to have a key role to play, although it is not yet understood to what extent different players could be called on to act.

Another identified gap in effective engagement of mid-tier owners, are their trusted sources of information. Experts suggested that investment media, relevant industry media and business and industry associations should be some of the potential sources further investigated.

There is widespread agreement among experts that supporting players and trusted information sources will be critical to activating the mid-tier. However, the best way

to make use of these important pathways to target particular types of building owners is still unclear, and requires additional research.

#### RECOMMENDATION

B1-2. Conduct national research to identify the most influential pathways to engagement with building owners and other intermediaries and information needs (*Human Condition*)

### 3 Mid-tier information needs

Our research and consultation has found that different stakeholders in the mid-tier building upgrade process have different information needs.

Recently completed work by ACIL Allen highlights the critical need for effective public information campaigns to be targeted, directly connect with actors, and to adapt information to specific audiences<sup>22</sup>.

We undertook an initial assessment of the information needs of various stakeholders across the stages of a building energy upgrade (Appendix 1). The assessment assumed that owners and others focused on building financial performance or final outcomes generally would require only high level information on the building energy upgrade process, but need to be convinced of the financial benefits.<sup>23</sup>

For those in more operational roles of services, they required both the technical detail, but critically the ability to translate this into a format that can connect with the more financially focussed decision makers.

Even within building owners, different types of owners will have different information needs based on their motivations. A completely disengaged owner will need something to capture their attention, whereas an active building owner may just need very simple, concise information to make a decision such as capital cost, payback and NABERS rating improvement.

This level of granularity will be important when engaging with different types of building owners in the mid-tier. However the outcome of the information needs

analysis – and the consensus of key stakeholders consulted for this report – was that the core message for building owners should be that if they haven't addressed the energy performance of their building, **their investment is suffering and they need to take action**. However this would require testing with the different ownership types.

Across all actors, these initial findings on information needs should be tested before being applied to the refinement or development of resources.

#### RECOMMENDATION

See B1-2.

As well as tailoring information to specific audiences, it is also important to consider the language used and ensure this also aligns with the target audience. Identifying language that will 'cut-through' with particular audiences should be part of testing information needs.

Another outcome of the consultation process was that working name of this project, the 'Building Retrofit Toolkit' was unlikely to be compelling for building owners. It also no longer reflects the vision for the delivery of resources to mid-tier building energy upgrade stakeholders.

Phrases such as 'building performance improvement', 'energy optimisation', 'office building optimisation', 'energy saving' and 'smart building' were all suggested and should also be tested with stakeholders.

<sup>22</sup> ACIL Allen (2015) Improving The Energy Efficiency Performance Of Small Office Buildings - Regulation Impact Statement for Consultation, pg 11.

<sup>23</sup> Building consultants and other energy efficiency specialists have been excluded from the needs analysis as these groups are considered experts and not the target of the materials.

### 3.1 Existing information and tools

There is no shortage of information and tools of change intended to support building owners and other stakeholders in improving the energy efficiency performance of their building already available in the marketplace.

A national and international review identified over 100 separate resources. While comprehensive, the review was not intended to be exhaustive, and there are certainly more resources available. However the resources identified beyond those listed in Appendix 2 tended to be duplication of content rather than new subject matter.

Analysis of the resources identified a number of common traits (Table 4) that may impact their effectiveness in engagement and behavioural change. Nevertheless, much if this content is high quality, shaped and targeted appropriately, these resources could be useful for mid-tier actors.

**Table 4: Summary analysis of identified resources**

Generally very high-quality information	It is strongly evident that significant technical and financial investment has been made in the majority of materials
Can be very hard to find	Whilst all available online, locating much of the information was genuinely challenging and certainly not the landing point on any site after a key-word search.
They target audience ill-defined	The majority of the materials are trying to be all things to all users, the content is not targeted to the specific needs of a specified user. For some users, the technical level of detail would be ideal, for others overwhelming and unnecessary. Never the less, the content will be very useful for the right audience.
Inconsistent terminology	Unsurprisingly given the different agencies and organisations involved in the development of materials and the timeframe over which they have been developed, the terminology is inconsistent.

Overwhelmingly huge	Some of these documents are huge 200+ pages huge. That's not to suggest the content isn't very useful, just that perhaps the form of presentation needs to be changed from a PDF file to an interactive online form.
Dated	Some regulations, programs, funding option etc are out of date.

The identified resources were classified by their core subject (Table 5). HVAC is the most common subject matter, which is unsurprising given the proportion of energy used by HVAC systems. The 'comprehensive' materials, the next most frequently identified, are those that attempt to guide the user through and end-to-end process of upgrading building energy performance.

**Table 5: Resources identified by classification and number identified**

HVAC (26)	Measurement and Verification (M&V) (2)
Comprehensive (23)	Metering (2)
Management (9)	Commissioning (1)
Financing (8)	Building fabric (1)
Lighting (7)	Appliances (1)
Energy generation (5)	Rating Tools (1)
Leasing (4)	Regulations / Standards (1)
Business case (3)	Retro-commissioning (1)
Hot water (3)	Tenant engagement (1)
BMS (2)	Ventilation (1)
Indoor Environmental Quality (IEQ) (2)	

The full list of identified resources is included at Appendix 2.

Based on the information needs analysis, an assessment has also been made of the most appropriate target audience for the identified materials. The vast majority of the materials are very technical and considered most suitable to operations

focussed building professional such as building and facility managers and building / service contractors.

In most cases the level of detail and type of language is unlikely to effectively engage building owners and other non-operational stakeholders. In addition, few of the materials reflect the different retrofit opportunities and challenges presented by mid-tier buildings.

Better reflecting the information needs, language and uniqueness of mid-tier buildings is essential in the refinement or development of materials.

#### **RECOMMENDATION**

D2-1. Adopting standard, agreed phraseology reflecting the outcomes of the key messages and connection pathways research, progressively update and refine existing materials to meet agreed information needs of the identified stakeholders

## 3.2 New materials needed

Although the information needs analysis still needs to be tested, a few gaps in existing resources have been identified.

### 3.2.1 Create buying confidence

There is a lack of procurement tools to assist a building owner or agent engaging service providers for an energy efficiency outcome. Creating confidence to make a purchasing decision is very important for uninformed participants.

Our engagement identified a number of options to create this buyer confidence including ensuring the availability of standard contracts or clauses for use in contracting relationships would substantially support buyers as well as simplifying the contracting process for suppliers.

There is a range of potentially suitable Australian Standard General Conditions of Contract that support energy efficiency upgrade and management processes but the suitability requires further investigation.

#### RECOMMENDATION

E2-1 Source or develop standard contracts / clauses for contracting relationships:

- energy efficiency services
- integrated building energy retrofit
- building management
- facilities management
- equipment supply

The Sustainability Victoria EEOB program successfully utilised an 'end-to-end' service model to ensure a single contract and point of contact throughout the upgrade process. This removes much of the complexity of engaging the variety of different experts that are needed in a comprehensive building energy upgrade

process. This model could be expanded or replicated nationally with vetted service providers.

The Energy Efficiency Certification Scheme (EECS) certifies professionals that can lead comprehensive energy retrofits of commercial buildings and provides an ideal basis for establishing qualifications, expertise and experience of service providers.

#### RECOMMENDATION

E2-2 Investigate the development of a national panel of 'end-to-end' building energy upgrade service providers including the requirement for EECS certification.

### 3.2.2 Link energy and asset management

Our property ownership and management experts identified the presentation of consideration of annual budgets and asset plans as a key point to include energy efficiency in the asset management process. A template asset management plan that includes energy efficiency would support building owners and their advisors in making timely energy efficiency decisions.

#### RECOMMENDATION

E3-6. Create template asset management plans.

### 3.2.3 Allow for comparison

One of the most common barriers to engagement with owners and other stakeholders we heard in our discussions was the lack of comparison data. This was also identified by the National Mid-tier Pathway.

The NABERS rating register does not currently allow for comparison of NABERS ratings by PCA classification or building size.

Owners and tenants would benefit from better insight to how their building or tenancy is performance relative to others of a similar nature and energy efficiency potential for their building.

#### RECOMMENDATION

E3-4. Research and establish performance benchmarks for similar assets – financial and energy focussed

#### 3.2.4 Support measurement and verification

The measurement and verification (M&V) related resources identified did not provide a standard or template M&V plan. A standard M&V plan for energy efficiency upgrades of commercial buildings will give building owners a roadmap for how energy savings can be effectively measured and verified, driving better practices from suppliers and increasing confidence that building owners will get what they pay for.

#### RECOMMENDATION

E2-4 Develop a standard measurement and verification plan for commercial building energy upgrades.

#### 3.2.5 Other insights

The National Mid-tier Pathway identified the need for a number of other resources and we recommend these also be developed in line with those identified here.

#### RECOMMENDATIONS

E2-3. Create new, targeted, case studies as they become available

E3-1. Develop a best-practice tenant - landlord energy efficiency performance memorandum of understanding

E3-2. Develop information about building life-cycle costs in relation to energy efficiency upgrades

## 4 Best approach for mid-tier

The scoping study began with the objective of establishing what a 'best practice' approach to building energy upgrades meant for the mid-tier.

Acknowledging the mid-tier spans a wide range of building types held by a wide range of owners, the experts we consulted agreed that a single focus on 'best practice' would be counterproductive, as it would be too narrow and limit engagement with building owners and other stakeholders.

Instead, the focus was expanded to engaging mid-tier building owners and progressing them through to a level of improved energy performance appropriate to their individual needs.

The consensus of experts consulted was that we should ensure building owners understand that there are different ways to upgrade the energy performance of their buildings, and that there is bound to be one that suits their objectives and budget.

Materials recently produced by the EEC with support of the NSW OEH articulate these different options (Figure 1).

### What are my options for upgrading my building?

There are three main ways to upgrade the energy performance of your building – there's bound to be one that suits your objectives and budget.

#### Energy Tune Up

Applying simple, effective strategies to tweak the building's energy-using systems to reduce energy use while maintaining or improving comfort.

#### Targeted Energy Retrofit

Upgrading one or two of the building's energy-using systems, such as lighting or air-conditioning, at some point after its initial construction and occupation.

#### Integrated Building Energy Retrofit (IBER)

An IBER approaches a building as an integrated system, and looks to upgrade its energy performance in a comprehensive way. An IBER can achieve significantly higher levels of energy and cost savings in a shorter period of time than a targeted retrofit by upgrading performance and carefully calibrating the interactions between the different energy-using processes and activities.

Figure 1: Building energy performance upgrade options

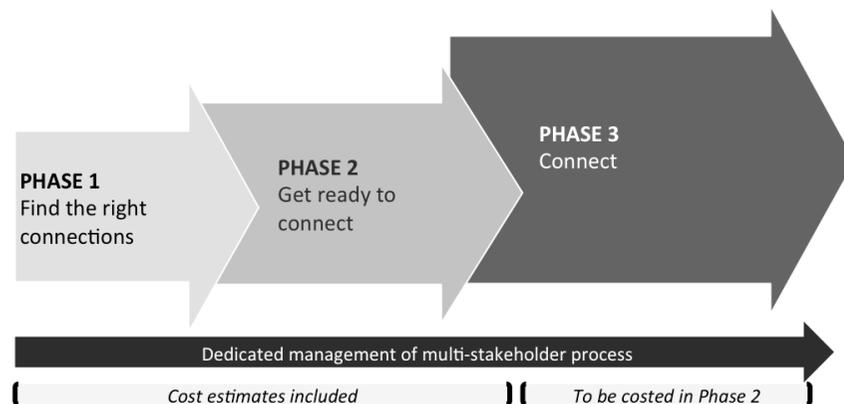
## 5 Development and deployment

The scoping study has established the need to move beyond the development and promotion of a best practice ‘toolkit’. Additional tools, information and support are necessary, but of themselves insufficient to achieve the wholesale improvement in energy efficiency business skills and outcomes in the mid-tier market we are seeking.

The biggest challenge is connecting with our target audience. There have been many attempts to engage with this notoriously challenging sector and it is the general consensus of those we consulted that a replicable, expandable and sustainable method of doing so has yet to be realised.

Finding the right pathways to engage with mid-tier actors is a critical first step in wholesale market transformation; there is very little likelihood of success in a one-size-fits-all approach and no one organisation is in a position to deliver all essential elements.

As such a phased approach is recommended.



Success will depend existing industry bodies, governments, industry participants and other interested parties working together, ideally as resourced sector network or forum to increase collaboration, innovation and exchange.

### 5.1 Leadership and governance

We recommend that the Commonwealth, States, leading local governments and key industry bodies work together to establish a forum to oversee the program.

A dedicated, resourced project manager should support the stakeholder forum and have responsibility for driving the program including coordination of stakeholders, development of certain materials and management of specialist consultancies. Housing this resource within one of the participating industry bodies would allow for a strong connection between industry and government.

#### RECOMMENDATIONS

A1-1. Appoint and maintain a dedicated project manager to drive the development and deployment program including coordination of stakeholders and management of specialist consultancies.

A1-2. Establish and manage a committee of project stakeholders to oversee the development and deployment of the mid-tier information clearinghouse.

### 5.2 Phase 1 - Find the right connections

The focus in Phase 1 is deepening our understanding of the mid-tier market: the owners, the buildings and the role and influence of other actors in the ownership, management, operation and occupation of mid-tier office buildings through the research previously recommended.

It is essential that the pathway to engagement be understood in order to design effective materials and a deployment strategy.

This knowledge must be established before further effort is expended in materials development and deployment.

## RECOMMENDATIONS

See also B1-1 and B1-2

### 5.3 Phase 2 - Get ready to connect

The focus in Phase 2 is leveraging the findings of Phase 1 research to design informed deployment plan.

The wide range of existing materials should be brought together in an accessible way. We recommend the development of an online information hub, designed to direct specific user groups to the information to meet their anticipated needs.

Existing material, progressively refined and updated would form the initial basis of the information hub, with new materials included as they are developed. New materials would also be progressively included into the online hub.

In line with our information needs analysis, those such as building owners should be directed towards only concise, high-level information, while those requiring detailed technical guidance will find this readily accessible.

## RECOMMENDATION

C2-1. Create a centralised, online, information hub accessible to all building upgrade stakeholders to host all of the identified materials and new tools and information as developed.

Initially, the availability of the information hub should be promoted through established channels such as State and local governments and industry bodies.

## RECOMMENDATION

F2-1. Promote the availability of the online clearinghouse through established trusted resources including State and local governments and industry bodies (FMA, PCA etc)

The Phase 1 research findings must also inform the development of a comprehensive deployment plan. It is likely that the plan would need to include

training of intermediaries, targeted advertising other engagement avenues including seminars and workshops.

## RECOMMENDATIONS

F2-2. Leverage findings of research into 'trusted information sources' for different types of building owners to design an informed deployment plan.

See also: A2-1, A2-2, A3-1, A3-2, C3-1, D2-1, D3-1, D3-2, E2-1 to 2-4, F3.1-3-6.

### 5.4 Phase 3 - Connect

The details of Phase 3 remain largely unknown at this stage as it is critical that an informed plan be developed based on a deep understanding of trusted connected pathways to owners and other actors. The focus however is on deployment as well as continuing program support and refinement of the hub.

## RECOMMENDATION

F3-1. Execute deployment plan including:

- training of intermediaries
- targeted advertising
- seminars / presentations / workshops / roadshows
- webinar / teleconference / videoconference

See also: A4-1, A4-2, C4-1, D4-1, E4-1, F4-1

#### 5.4.1 Deployment considerations

There are a number of critical decision-making points in a building lifecycle (Table 6) where engagement on building energy performance is considered likely to have greater effect. Exploiting these critical decision-making points should be a key principle of the deployment plan.

Table 6: Critical decision points for consideration of energy efficiency<sup>24</sup>

Decision-making point	Opportunity
Change in energy procurement	Changes in tariff structures or pricing, or the renewal of an energy supply contract can draw attention to energy costs and provide an opportunity for consideration of energy and money saving opportunities.
End of life replacement of HVAC, lighting or other major equipment	Major equipment fails over time, and the need for replacement provides an ideal opportunity to address energy and other building systems.
Roof, window or other major envelope replacement	Roof, window and other major envelope repairs or replacements may be undertaken for safety or structural reasons or in a significant repositioning of the asset. Such significant works provide opportunities for improvements in day lighting and efficiency at only minor incremental cost.
Changes to regulation and legislation	<p>Changing building codes and other standards may require upgrades to the building systems such as fire systems or access. These works also provide an opportunity to consider energy performance improvements.</p> <p>Legislation such as the Commercial Building Disclosure Program, particularly the proposed lowering of the disclosure threshold provides an ideal opportunity to intervene with building owners.</p> <p>The R22 phase out is also another important trigger driving equipment replacement.</p>
New acquisition or refinancing	A new acquisition, or refinancing an existing asset can support attractively financed building performance upgrades as part of the transaction, which may not have been possible at other times.

Major occupancy change	A tenant moving a significant number of people into a building, or a major turnover in square meterage, presents a prime opportunity for a building energy upgrade, for three reasons. First, a comprehensive retrofit can generate interior layouts that improve energy and space efficiency, and can create more leasable space through downsizing mechanical equipment. Second, ownership can leverage tenant investment in the fit-out. Third, tenant disruption can be minimised as the retrofit can be undertaken during the changeover period.
Presentation and consideration of annual budgets and asset plans	Presentation and consideration of annual budgets and asset plans is an important 'gateway' to influence owners. Asset management plans should identify end-of-life opportunities and what can be done at the same time. Template asset management plans should be developed.

<sup>24</sup> Adapted from The RetroFit Depot Guide to Building the Case for Deep Energy Retrofits (RMI unknown)

## 6 Detailed program

The scoping study has established the need to move beyond the development and promotion of a best practice ‘toolkit’ to a tailored, targeted connection initiative.

Our recommendations provide the structure and approach for a phased, comprehensive project that:

- Consolidates and coordinates effort between industry bodies, local governments, states and the Commonwealth
- Introduces clarity and consistency in messaging and terminology, while better targeting existing information to particular actors in the mid tier
- Develops critical missing resources that build the confidence of decision makers to procure energy efficiency services and support a high quality energy efficiency outcome
- Lays the foundation for a widespread, effective effort to improve mid-tier energy performance.

The key tasks, timing and costs for a five-year implementation program have been set out in detail over page, with a summary in Table 7. Deployment cost estimates have not been included as developing these would be part of the detailed design process in Phase 2.

There is significant scope to establish the respective roles of this proposed program and the Mid-tier National Pathway. Potentially, this project could be a delivery vehicle for the information, tools and outreach components proposed in the Mid-Tier National Pathway, but will not cover the regulatory measures and non-energy related research elements of the Mid-Tier National Pathway. .

The approach of focusing first on developing administration and tools for energy efficiency, and then incorporating other aspects of sustainability into this framework as they are developed, would mirror the development of NABERS tool.

Table 7: Five-year program summary

<b>PHASE 1</b>		
<b>Find the right connections</b>	YR1	\$250,000
<b>PHASE 2</b>		
<b>Get ready to connect</b>	YR2	\$335,000
	YR 3 (part)	\$205,000
<b>PHASE 3</b>	YR 3 (part) and YR 4 – coordination only	
<b>Connect</b>	<i>(excludes deployment costs not yet costed)</i>	\$95,000
	YR 5 – coordination only	
	<i>(excludes deployment costs not yet costed)</i>	\$95,000
<b>TOTAL</b>		<b>\$980,000</b>

While an integrated approach is recommended, many of the recommended elements could be progressed immediately for inclusion in the overarching framework once all stakeholders agree a delivery and funding mechanism.

Given the multi-party participation in mid-tier engagement, it is anticipated that funding would be sourced from a variety of contributors including cash and in-kind contributions from various governments and industry bodies.

FOCUS	TASK	EST COST	POTENTIAL DELIVERY	ADDITIONAL COMMENTS
PHASE 1				
YEAR 1				
A. Project leadership	A1-1. Appoint and maintain a dedicated project manager to drive the development and deployment program including coordination of stakeholders and management of specialist consultancies.	\$75,000	Role to be managed by an appropriate overarching industry body	Estimated as a 0.5 FTE @ \$120K plus \$15,000 on-costs.  There is the potential for this role to also provide the necessary coordination and support to the National Mid-tier Pathway process if appointed as 1.0 FTE with associated additional costs.
	A1-2. Establish and manage a committee of project stakeholders to oversee the development and deployment of the mid-tier information clearinghouse.	\$-	Administered by project manager	If aligned with the National Mid-tier Pathway, this group could be established as one of a number of mid-tier working groups.  GBCA 5.2, GBCA 5.4
B. Further understanding	B1-1. Conduct further research into the number, size, grade, location, ownership structure, management approach, tenant profile, energy performance and equipment condition of mid-tier commercial buildings in Australia ( <i>Physical Condition</i> )	\$75,000	Engage specialist research consultancy under direction of project manager	GBCA 1.1
	B1-2. Conduct national research to identify the most influential pathways to engagement with building owners and other intermediaries and information needs ( <i>Human Condition</i> )	\$100,000	Engage specialist research consultancy under direction of project manager	There are a number of 'cohorts' of building owners already established including the NSW 'No more average buildings' campaign.  However cohorts would need to be built and engaged for other stakeholder groups.  The key outcome of this research should be to better understand the pathways to better engagement with building owners, such as the influence of tenants, managing agents and leasing agents.  GBCA 1.2
C. Create access	NA for Year 1	\$-		
D. Existing materials	NA for Year 1	\$-		

FOCUS	TASK	EST COST	POTENTIAL DELIVERY	ADDITIONAL COMMENTS
E. New Materials	NA for Year 1	\$-		
F. Deployment	NA for Year 1	\$-		
<b>PHASE 2</b>				
<b>YEAR 2</b>				
A. Project leadership	A2-1. On-going maintenance of a dedicated project manager	\$75,000	0.5 FTE on-going project manager plus \$15,000 expenses – Role to be managed by an appropriate overarching industry body	Estimated as a 0.5 FTE @ \$120K plus \$15,000 on-costs.  There is the potential for this role to also provide the necessary coordination and support to the National Mid-tier Pathway process if appointed as 1.0 FTE with associated additional costs.
	A2-2. On-going management of stakeholder committee	\$-	Administered by project manager	If aligned with the National Mid-tier Pathway, this group could be established as one of a number of mid-tier working groups.  GBCA 5.2, GBCA 5.4
B. Further understanding	NA for Year 2			
C. Create access	C2-1. Create a centralised, online, information clearinghouse accessible to all building upgrade stakeholders to host all of the identified materials and new tools and information as developed.	\$100,000	Engage specialist web design and build consultancy under direction of project manager	The expectation is that the clearinghouse would be constructed in such a way as to direct users specifically to the type of information they will need and be able to be managed and updated by the project manager.  GBCA 3.2, GBCA 3.4 (part)

FOCUS	TASK	EST COST	POTENTIAL DELIVERY	ADDITIONAL COMMENTS
D. Existing materials	D2-1. Adopting standard, agreed phraseology reflecting the outcomes of the key messages and connection pathways research, progressively update and refine existing materials to meet agreed information needs of the identified stakeholders	\$-	Role of project manager	<p>This would include the information needs specified in the National Mid-tier Pathway including:</p> <ul style="list-style-type: none"> <li>Promote a range of financing mechanisms to encourage upgrades/ retrofits. E.g. accelerated depreciation, rebates, low interest loans and Environmental Upgrade Agreements.</li> <li>Raise awareness and promote the use of existing tools such as NABERS, Green Star, Calculating Cool, LEASA App.</li> <li>Promote existing green leasing resources to mid-tier stakeholders</li> <li>Compile case studies that demonstrate a compelling and quantified business case for energy efficiency upgrades. There are new case studies being produced including from the Sustainability Victoria mid-tier tuning program.</li> </ul> <p>GBCA 2.1, GBCA 3.1, GBCA 4.2, GBCA 4.4, GBCA 6.1</p>
E. New Materials	<p>E2-1 Source or develop standard contracts / clauses for contracting relationships:</p> <ul style="list-style-type: none"> <li>energy efficiency services</li> <li>integrated building energy retrofit</li> <li>building management</li> <li>facilities management</li> <li>equipment supply</li> </ul>	\$100,000	Engage specialist legal advice under direction of project manager	
	E2-2 Investigate the development of a national panel of 'end-to-end' building energy upgrade service providers including the requirement for EECS certification.	\$-	Role of project manager	
	E2-3. Create new, targeted, case studies as they become available	\$-	Role of project manager	GBCA 2.1

FOCUS	TASK	EST COST	POTENTIAL DELIVERY	ADDITIONAL COMMENTS
	E2-4 Develop a standard measurement and verification plan for commercial building energy upgrades.	\$10,000	Role of project manager with specialist input	
F. Deployment	F2-1. Promote the availability of the online clearinghouse through established trusted resources including State and local governments and industry bodies (FMA, AIRAH etc)	\$-	Role of project manager	GBCA 3.4, GBCA 5.1 (part)
	F2-2. Leverage findings of research into 'trusted information sources' for different types of building owners to design an informed deployment plan.	\$50,000	Engage specialist communications consultancy under direction of project manager	GBCA 3.4, GBCA 3.5, GBCA 5.1 (part)

FOCUS	TASK	EST COST	POTENTIAL DELIVERY	ADDITIONAL COMMENTS
<b>YEAR 3</b>				
A. Project leadership	A3-1. On-going maintenance of a dedicated project manager	\$75,000	0.5 FTE on-going project manager plus \$15,000 expenses – Role to be managed by an appropriate overarching industry body	Estimated as a 0.5 FTE @ \$120K plus \$15,000 on-costs.  There is the potential for this role to also provide the necessary coordination and support to the National Mid-tier Pathway process if appointed as 1.0 FTE with associated additional costs.
	A3-2. On-going management of stakeholder committee	\$-	Administered by project manager	If aligned with the National Mid-tier Pathway, this group could be established as one of a number of mid-tier working groups.  GBCA 5.2, GBCA 5.4
B. Further understanding	NA for Year 3			
C. Create access	C3-1. Service and expand the centralised, online, information clearinghouse	\$10,000	Role of project manager with small input from developer	GBCA 3.2, GBCA 3.4 (part)
D. Existing materials	D3-1 Progressively update existing materials	\$10,000	Role of project manager with specialist input	GBCA 2.1, GBCA 3.1, GBCA 4.2, GBCA 4.4, GBCA 6.1
	D3-2. Continue to identify materials for inclusion in the central clearinghouse and inform refinement of materials.	\$-	Role of project manager	GBCA 2.1
E. New Materials	E3-1. Develop a best-practice tenant - landlord energy efficiency performance memorandum of understanding	\$10,000	Role of project manager with specialist input	GBCA 4.3
	E3-2. Develop information about building life-cycle costs in relation to energy efficiency upgrades	\$50,000	Role of project manager with specialist input	GBCA 2.2
	E3-4. Research and establish performance benchmarks for similar assets – financial and energy focussed	\$50,000	Engage specialist research consultancy under direction of project manager	GBCA 2.1
	E3-5. Create new, targeted, case studies as they become available	\$-	Role of project manager	GBCA 2.1

FOCUS	TASK	EST COST	POTENTIAL DELIVERY	ADDITIONAL COMMENTS
	E3-6. Create template asset management plans.			
<b>PHASE 3</b>				
F. Deployment	F3-1. Execute deployment plan including: <ul style="list-style-type: none"> <li>• training of intermediaries</li> <li>• targeted advertising</li> <li>• seminars / presentations / workshops / roadshows</li> <li>• webinar / teleconference / videoconference</li> </ul>	Not estimated	Coordinated by project manager with identified participants	<p>Part of the development process of the deployment plan will be identifying the best pathways for deployment for the different stakeholders. This may be local government, industry bodies, news media etc.</p> <p>ACIL Allen estimated \$800,000 per annum for such a campaign<sup>25</sup>, but accurate costs would be determined during development.</p> <p>Some costs could be met through in-kind contributions of some participants.</p> <p>GBCA 3.4, GBCA 3.5, GBCA 5.1 (part)</p>
<b>YEAR 4 AND 5</b>				
A. Project leadership	A4-1. On-going maintenance of a dedicated project manager	\$75,000	0.5 FTE on-going project manager plus \$15,000 expenses – Role to be managed by an appropriate overarching industry body	<p>Estimated as a 0.5 FTE @ \$120K plus \$15,000 on-costs.</p> <p>There is the potential for this role to also provide the necessary coordination and support to the National Mid-tier Pathway process if appointed as 1.0 FTE with associated additional costs.</p>
	A4-2. On-going management of stakeholder committee	\$-	Administered by project manager	<p>If aligned with the National Mid-tier Pathway, this group could be established as one of a number of mid-tier working groups.</p> <p>GBCA 5.2, GBCA 5.4</p>
B. Further understanding	NA for Year 4			
C. Create access	C4-1. Service and expand the centralised, online, information clearinghouse	\$10,000	Role of project manager with small input from developer	GBCA 3.2, GBCA 3.4 (part)
D. Existing materials	D4-1 Maintain existing materials.	\$10,000	Role of project manager with specialist input	GBCA 2.1, GBCA 3.1, GBCA 4.2, GBCA 4.4, GBCA 6.1

<sup>25</sup> ACIL Allen (2015) Improving The Energy Efficiency Performance Of Small Office Buildings - Regulation Impact Statement for Consultation

FOCUS	TASK	EST COST	POTENTIAL DELIVERY	ADDITIONAL COMMENTS
E. New Materials	E4-1. Create new, targeted, case studies as they become available	\$-	Role of project manager	GBCA 2.1
F. Deployment	F4-1. Execute deployment plan including: <ul style="list-style-type: none"> <li>• training of intermediaries</li> <li>• targeted advertising</li> <li>• seminars / presentations / workshops / roadshows</li> <li>• webinar / teleconference / videoconference</li> </ul>	Not estimated	Coordinated by project manager with identified participants	To be determined during development of the deployment plan. GBCA 3.4, GBCA 3.5, GBCA 5.1 (part)

## APPENDICES

### APPENDIX 1: Stakeholder knowledge needs analysis

Retrofit Stage <i>(not always sequential)</i>	Building owners	Leasing and Property Management professionals, Valuers (financial focused)	Building / Facilities Managers (operational focused)	Building / Service Contractors	Tenants	Government industry bodies and other intermediaries	Trusted Advisors – Lawyers, Accountants, Business Consultants
Awareness – Create  (For those not yet cognisant of issue)	<ul style="list-style-type: none"> <li>Investment is at risk</li> <li>Regulatory rights and obligations</li> <li>Benefits of energy efficient buildings for owners and occupiers</li> </ul>	<ul style="list-style-type: none"> <li>Owners investment is at risk</li> <li>Regulatory rights and obligations</li> <li>Benefits of energy efficient buildings for owners and occupiers</li> </ul>	<ul style="list-style-type: none"> <li>Regulatory rights and obligations</li> <li>Benefits of energy efficient buildings for owners and occupiers</li> </ul>	<ul style="list-style-type: none"> <li>Regulatory rights and obligations</li> <li>Benefits of energy efficient buildings for owners and occupiers</li> </ul>	<ul style="list-style-type: none"> <li>Regulatory rights and obligations</li> <li>Benefits of energy efficient buildings for owners and occupiers</li> </ul>	<ul style="list-style-type: none"> <li>Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Owners investment is at risk</li> <li>Regulatory rights and obligations</li> <li>Benefits of energy efficient buildings for owners and occupiers</li> </ul>
Consideration - Baseline	<ul style="list-style-type: none"> <li>Opportunities for improved financial performance</li> <li>Performance benchmarks for similar assets – financial and energy focussed</li> <li>Awareness of building performance rating tools</li> <li>Engaging with tenant</li> </ul>	<ul style="list-style-type: none"> <li>Opportunities for improved financial performance</li> <li>Performance benchmarks for similar assets – financial and energy focussed</li> <li>Awareness of building performance rating tools</li> <li>Engaging with tenant</li> </ul>	<ul style="list-style-type: none"> <li>Technical know-how and tools</li> <li>Presenting outcomes to building owners</li> <li>Engaging with tenant</li> </ul>	<ul style="list-style-type: none"> <li>Technical know-how and tools</li> <li>Presenting outcomes to building owners</li> <li>Engaging with tenant</li> </ul>	<ul style="list-style-type: none"> <li>Performance benchmarks for similar assets – financial and energy focussed</li> <li>Awareness of building performance rating tools</li> <li>Engaging with landlord</li> </ul>	<ul style="list-style-type: none"> <li>Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Opportunities for improved financial performance</li> <li>Performance benchmarks for similar assets – financial and energy focussed</li> <li>Awareness of building performance rating tools</li> </ul>

Retrofit Stage <i>(not always sequential)</i>	Building owners	Leasing and Property Management professionals, Valuers <i>(financial focused)</i>	Building / Facilities Managers <i>(operational focused)</i>	Building / Service Contractors	Tenants	Government industry bodies and other intermediaries	Trusted Advisors – Lawyers, Accountants, Business Consultants
Consideration – Identify Opportunities	<ul style="list-style-type: none"> <li>High level opportunity identification process information</li> </ul>	<ul style="list-style-type: none"> <li>High level opportunity identification process information</li> </ul>	<ul style="list-style-type: none"> <li>Opportunity identification technical know-how and tools</li> <li>Presenting outcomes to building owners</li> <li>Stakeholder engagement including tenant</li> </ul>	<ul style="list-style-type: none"> <li>Opportunity identification technical know-how and tools</li> <li>Presenting outcomes to building owners</li> <li>Stakeholder engagement including tenant</li> </ul>	<ul style="list-style-type: none"> <li>High level opportunity identification process information</li> <li>Engaging with landlord</li> </ul>	<ul style="list-style-type: none"> <li>Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>High level opportunity identification process information</li> </ul>
Plan – Financing	<ul style="list-style-type: none"> <li>Financial and non-conventional analysis of opportunities</li> <li>Sources of external financing</li> <li>Engaging with tenant</li> </ul>	<ul style="list-style-type: none"> <li>Financial and non-conventional analysis of opportunities</li> <li>Sources of external financing</li> <li>Knowledge of operating and capital expenditure process</li> <li>Engaging with tenant</li> </ul>	<ul style="list-style-type: none"> <li>Financial and non-conventional analysis of opportunities</li> <li>Knowledge of operating and capital expenditure process</li> <li>Sources of external financing</li> <li>Presenting outcomes to building owners</li> <li>Stakeholder engagement including tenant</li> </ul>	<ul style="list-style-type: none"> <li>Financial and non-conventional analysis of opportunities</li> <li>Knowledge of operating and capital expenditure process</li> <li>Sources of external financing</li> <li>Presenting outcomes to building owners</li> <li>Stakeholder engagement including tenant</li> </ul>	<ul style="list-style-type: none"> <li>Financial and non-conventional analysis of opportunities</li> <li>Sources of external financing</li> <li>Knowledge of operating and capital expenditure process</li> <li>Engaging with landlord</li> </ul>	<ul style="list-style-type: none"> <li>Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Financial and non-conventional analysis of opportunities</li> <li>Sources of external financing</li> </ul>

<b>Retrofit Stage</b> <i>(not always sequential)</i>	<b>Building owners</b>	<b>Leasing and Property Management professionals, Valuers (financial focused)</b>	<b>Building / Facilities Managers (operational focused)</b>	<b>Building / Service Contractors</b>	<b>Tenants</b>	<b>Government industry bodies and other intermediaries</b>	<b>Trusted Advisors – Lawyers, Accountants, Business Consultants</b>
Plan – Set Targets	<ul style="list-style-type: none"> <li>• Potential / appropriate targets</li> <li>• Engaging with tenant</li> </ul>	<ul style="list-style-type: none"> <li>• Potential / appropriate targets</li> <li>• Supporting building owners in setting targets</li> </ul>	<ul style="list-style-type: none"> <li>• Technical know-how and tools in developing appropriate targets</li> <li>• Supporting building owners in setting targets</li> </ul>	<ul style="list-style-type: none"> <li>• Technical know-how and tools in developing appropriate targets</li> <li>• Supporting building owners in setting targets</li> </ul>	<ul style="list-style-type: none"> <li>• Potential / appropriate targets</li> <li>• Engaging with landlord</li> </ul>	<ul style="list-style-type: none"> <li>• Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• Potential / appropriate targets</li> <li>• Supporting building owners in setting targets</li> </ul>
Plan – Business case	<ul style="list-style-type: none"> <li>• Business case interpretation</li> <li>• Financial and non-conventional analysis of opportunities including whole of life</li> <li>• Risk assessment</li> <li>• Other factors for consideration</li> </ul>	<ul style="list-style-type: none"> <li>• Preparing and presenting a business case to executive / decision maker</li> <li>• Financial and non-conventional analysis of opportunities including whole of life</li> <li>• Risk assessment</li> <li>• Other factors for consideration</li> </ul>	<ul style="list-style-type: none"> <li>• Preparing and presenting a business case to executive / decision maker</li> <li>• Financial and non-conventional analysis of opportunities including whole of life</li> <li>• Risk assessment</li> <li>• Other factors for consideration</li> </ul>	<ul style="list-style-type: none"> <li>• Preparing and presenting a business case to executive / decision maker</li> <li>• Financial and non-conventional analysis of opportunities including whole of life</li> <li>• Risk assessment</li> <li>• Other factors for consideration</li> </ul>	<ul style="list-style-type: none"> <li>• Business case interpretation</li> <li>• Financial and non-conventional analysis of opportunities including whole of life</li> <li>• Risk assessment</li> <li>• Other factors for consideration</li> </ul>	<ul style="list-style-type: none"> <li>• Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• Business case interpretation</li> <li>• Financial and non-conventional analysis of opportunities including whole of life</li> <li>• Risk assessment</li> <li>• Other factors for consideration</li> </ul>

<b>Retrofit Stage</b> <i>(not always sequential)</i>	<b>Building owners</b>	<b>Leasing and Property Management professionals, Valuers (financial focused)</b>	<b>Building / Facilities Managers (operational focused)</b>	<b>Building / Service Contractors</b>	<b>Tenants</b>	<b>Government industry bodies and other intermediaries</b>	<b>Trusted Advisors – Lawyers, Accountants, Business Consultants</b>
Plan – Design approach	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes – options and supporting tools</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> </ul>	<ul style="list-style-type: none"> <li>• Technical know-how and tools</li> <li>• Engaging tenants in the process</li> <li>• Risk management</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• Technical know-how and tools</li> <li>• Engaging tenants in the process</li> <li>• Risk management</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• Engaging in the building energy upgrade process</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes – options and supporting tools</li> </ul>	<ul style="list-style-type: none"> <li>• Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes – options and supporting tools</li> </ul>
Implement - Tune HVAC Implement - Tune Lighting Implement - Tune Plug & Process Loads Implement - Tune Envelope Implement - Tune Hot Water Service	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes – options and supporting tools</li> <li>• Project management</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Project management</li> </ul>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Technical know-how and tools</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Technical know-how and tools</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes – options and supporting tools</li> <li>• Project management / participation</li> </ul>	<ul style="list-style-type: none"> <li>• Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes</li> </ul>

<b>Retrofit Stage</b> <i>(not always sequential)</i>	<b>Building owners</b>	<b>Leasing and Property Management professionals, Valuers (financial focused)</b>	<b>Building / Facilities Managers (operational focused)</b>	<b>Building / Service Contractors</b>	<b>Tenants</b>	<b>Government industry bodies and other intermediaries</b>	<b>Trusted Advisors – Lawyers, Accountants, Business Consultants</b>
Implement - Retrofit HVAC Implement - Retrofit Lighting Implement - Retrofit Plug & Process Loads Implement - Retrofit Envelope Implement - Retrofit Hot Water Service	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes – options and supporting tools</li> <li>• Project management</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Project management</li> </ul>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Technical know-how and tools</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Technical know-how and tools</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes – options and supporting tools</li> <li>• Project management / participation</li> </ul>	<ul style="list-style-type: none"> <li>• Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes</li> </ul>
Commission	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes</li> <li>• Project management</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Project management</li> </ul>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Technical know-how and tools</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Technical know-how and tools</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes</li> <li>• Project management / participation</li> </ul>	<ul style="list-style-type: none"> <li>• Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes</li> </ul>

<b>Retrofit Stage</b> <i>(not always sequential)</i>	<b>Building owners</b>	<b>Leasing and Property Management professionals, Valuers (financial focused)</b>	<b>Building / Facilities Managers (operational focused)</b>	<b>Building / Service Contractors</b>	<b>Tenants</b>	<b>Government industry bodies and other intermediaries</b>	<b>Trusted Advisors – Lawyers, Accountants, Business Consultants</b>
Measurement and verification	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes</li> <li>• Project management</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Project management</li> </ul>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Technical know-how and tools</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Technical know-how and tools</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes</li> <li>• Project management / participation</li> </ul>	<ul style="list-style-type: none"> <li>• Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes</li> </ul>
Ongoing Monitoring & Maintenance	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes</li> <li>• Project management</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Project management</li> </ul>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Technical know-how and tools</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Technical know-how and tools</li> <li>• Stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes</li> <li>• Project management / participation</li> </ul>	<ul style="list-style-type: none"> <li>• Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> <li>• Performance expectations</li> <li>• Contracting for energy efficiency outcomes</li> </ul>
Leasing	<ul style="list-style-type: none"> <li>• High level process information</li> </ul>	<ul style="list-style-type: none"> <li>• Leasing for energy efficiency outcomes</li> </ul>	<ul style="list-style-type: none"> <li>• Leasing for energy efficiency outcomes</li> </ul>		<ul style="list-style-type: none"> <li>• Leasing for energy efficiency outcomes</li> </ul>	<ul style="list-style-type: none"> <li>• Availability and content of information to support all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• High level process information</li> </ul>

## APPENDIX 2: Information and tools identified

(available in Microsoft Excel on request)

Organisation	Item	Year	Core subject	Building owners	Leasing and Property Management professionals, Valuers (financial focused)	Building / Facilities Managers (operational focused)	Building / Service Contractors	Tenants	Government industry bodies and other intermediaries	Trusted Advisors – Lawyers, Accountants, Business Consultants
AEPCA	A Best Practice Guide to Energy Performance Contracts	2000	Financing			Y	Y			Y
AEPCA	A Best Practice Guide to Measurement and Verification of Energy Savings - A companion document to 'A Best Practice Guide to Energy Performance Contracts'	2004	M&V			Y	Y			
Energy Efficiency Exchange website (eex.gov.au)	Adopt non-technical building management strategies		Operation			Y	Y			
ASHRAE (US)	Advanced Energy Design Guide - Small to Medium Office Buildings	2011	Comp			Y	Y			
U.S. Department of Energy / Pacific Northwest National Laboratory	Advanced Energy Retrofit Guides - Office Buildings	2011	Comp			Y	Y			
City of Melbourne / 1200 Buildings	Advice Sheet - Adopting an effective retrofit process		Management	Y	Y	Y	Y			Y
City of Melbourne / 1200 Buildings	Advice Sheet - Complying with regulations		Regulations / Standards	Y	Y	Y	Y			Y
City of Melbourne / 1200 Buildings	Advice Sheet - Considering building technologies		Comp			Y	Y			
City of Melbourne / 1200 Buildings	Advice Sheet - Considering retrofitting your building?		Comp	Y		Y				

Organisation	Item	Year	Core subject	Building owners	Leasing and Property Management professionals, Valuers (financial focused)	Building / Facilities Managers (operational focused)	Building / Service Contractors	Tenants	Government industry bodies and other intermediaries	Trusted Advisors – Lawyers, Accountants, Business Consultants
City of Melbourne / 1200 Buildings	Advice Sheet - Energy Saver Incentive for commercial lighting		Financing	Y		Y	Y			Y
City of Melbourne / 1200 Buildings	Advice Sheet - Essential documents in retrofits		Management	Y	Y	Y	Y			Y
City of Melbourne / 1200 Buildings	Advice Sheet - Financing your retrofit		Financing	Y		Y	Y			Y
City of Melbourne / 1200 Buildings	Advice Sheet - Liaising with tenants during a retrofits		Tenant engagement	Y	Y	Y	Y			
City of Melbourne / 1200 Buildings	Advice Sheet - Maintaining the building after a retrofit		Operation			Y	Y			
City of Melbourne / 1200 Buildings	Advice Sheet - Managing HVAC for better building performance		HVAC			Y	Y			
City of Melbourne / 1200 Buildings	Advice Sheet - Using rating tools in a retrofit		Rating Tools			Y	Y			
Carbon Trust (UK)	Air conditioning technology guide (CTG005)		HVAC			Y	Y			
CitySwitch	Best practice leasing		Leasing		Y			Y		Y
Council of Australian Government Commercial Buildings Committee	Calculating Cool tool		HVAC			Y	Y			
OEH	Calculight – the energy efficient lighting upgrade calculator	2014	Lighting			Y	Y			

Organisation	Item	Year	Core subject	Building owners	Leasing and Property Management professionals, Valuers (financial focused)	Building / Facilities Managers (operational focused)	Building / Service Contractors	Tenants	Government industry bodies and other intermediaries	Trusted Advisors – Lawyers, Accountants, Business Consultants
City of Sydney	Commercial building improvement guide	2015	Comp	Y	Y	Y				
Energy Efficiency Exchange website (eex.gov.au)	Consider installing cogeneration or trigeneration technologies		Energy generation			Y	Y			
Carbon Trust (UK)	Delivering the future, today - Project owner's guide	2012	Comp			Y	Y			
OEH	Energy Efficiency and Renewables Finance Guide	2014	Energy generation	Y		Y	Y			Y
Sustainability Victoria	Energy Efficiency Best Practice Guide: Lighting 2009	2009	Lighting			Y	Y			
OEH	Energy efficient HVAC for business training materials	2015	HVAC			Y	Y			
CitySwitch	Energy efficient lighting for tenants		Lighting					Y		
OEH	Energy efficient lighting technology report	2014	Lighting			Y	Y			
OEH	Energy efficient lighting training materials	2015	Lighting			Y	Y			
OEH	Energy Management Guide for Tenants	2012	Comp					Y		
Building Owners & Managers Association (BOMA) International (US)	Energy Performance Contracting Model (BEPC) toolkit	2015	Comp			Y	Y			Y

Organisation	Item	Year	Core subject	Building owners	Leasing and Property Management professionals, Valuers (financial focused)	Building / Facilities Managers (operational focused)	Building / Service Contractors	Tenants	Government industry bodies and other intermediaries	Trusted Advisors – Lawyers, Accountants, Business Consultants
ARUP/PCA	Existing Buildings Survival Strategies - Do It Yourself	2009	Comp	Y		Y	Y			
ARUP/PCA	Existing Buildings Survival Strategies - Financial Analysis	2009	Financing	Y		Y	Y			Y
ARUP/PCA	Existing Buildings Survival Strategies - General Information	2009	Comp							
ARUP/PCA	Existing Buildings Survival Strategies - Six Easy Steps to a survival strategy for your building	2009	Comp	Y		Y	Y			
CitySwitch	Financing sustainable office upgrades		Financing					Y		Y
COAG	Green Lease Handbook	2012	Leasing		Y			Y		Y
City of Melbourne	Greening Your Building: A toolkit for improving asset performance	2008	Comp			Y	Y			
Carbon Trust (UK)	Heat recovery - A guide to key systems and applications		HVAC			Y	Y			
CitySwitch	Heating and cooling for tenants		HVAC					Y		
Carbon Trust (UK)	Heating control technology guide (CTG065)		HVAC			Y	Y			
Rocky Mountain Institute (US)	How to Calculate and Present Deep Retrofit Value: A Guide For Investors	2015	Business case	Y	Y					Y

Organisation	Item	Year	Core subject	Building owners	Leasing and Property Management professionals, Valuers (financial focused)	Building / Facilities Managers (operational focused)	Building / Service Contractors	Tenants	Government industry bodies and other intermediaries	Trusted Advisors – Lawyers, Accountants, Business Consultants
Carbon Trust (UK)	How to implement advanced combustion control (CTL058)		HVAC			Y	Y			
Carbon Trust (UK)	How to implement air quality sensors (CTL059)		IEQ			Y	Y			
Carbon Trust (UK)	How to implement blowdown heat recovery (CTL020)		HVAC			Y	Y			
Carbon Trust (UK)	How to implement boiler sequence controls (CTL144)		HVAC			Y	Y			
Carbon Trust (UK)	How to implement condensing boilers (CTL143)		HVAC			Y	Y			
Carbon Trust (UK)	How to implement de-stratification fans (CTL023)		HVAC			Y	Y			
Carbon Trust (UK)	How to implement decentralised hot water systems (CTL146)		Hot water			Y	Y			
Carbon Trust (UK)	How to implement electric heater controls (CTL025)		HVAC			Y	Y			
Carbon Trust (UK)	How to implement heat recovery (CTL030)		HVAC			Y	Y			
Carbon Trust (UK)	How to implement heating zone controls (CTL148)		HVAC			Y	Y			
Carbon Trust (UK)	How to implement liquid amplification to a refrigeration plant (CTL055)		HVAC			Y	Y			
Carbon Trust (UK)	How to implement oxygen trim control (CTL147)		IEQ			Y	Y			

Organisation	Item	Year	Core subject	Building owners	Leasing and Property Management professionals, Valuers (financial focused)	Building / Facilities Managers (operational focused)	Building / Service Contractors	Tenants	Government industry bodies and other intermediaries	Trusted Advisors – Lawyers, Accountants, Business Consultants
Carbon Trust (UK)	How to implement process thermal insulation (CTL038)		HVAC			Y	Y			
Carbon Trust (UK)	How to implement radiant heaters (CTL039)		HVAC			Y	Y			
Carbon Trust (UK)	How to implement thermal insulation (CTL145)		Building fabric			Y	Y			
Carbon Trust (UK)	How to implement thermostatic radiator valves (CTL040)		HVAC			Y	Y			
Energy Efficiency Exchange website (eex.gov.au)	Improve energy metering and monitoring		Metering			Y	Y			
Energy Efficiency Exchange website (eex.gov.au)	Improve heating, ventilation, air-conditioning (HVAC) efficiency		HVAC			Y	Y			
Energy Efficiency Exchange website (eex.gov.au)	Improve lighting efficiency		Lighting			Y	Y			
Carbon Trust (UK)	Industrial heat recovery equipment (CTL037)		HVAC			Y	Y			
Carbon Trust (UK)	Low carbon buildings – Control systems	2011	BMS			Y	Y			
Carbon Trust (UK)	Low carbon buildings – Ground source heat pumps	2011	HVAC			Y	Y			
Carbon Trust (UK)	Low carbon buildings – Metering and monitoring systems	2011	Metering			Y	Y			

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Carbon Trust (UK)	Low carbon buildings – Natural ventilation	2011	Ventilation			Y	Y			
Carbon Trust (UK)	Low carbon buildings – Retrofitting renewables	2011	Energy generation			Y	Y			
Carbon Trust (UK)	Low carbon buildings – Biomass	2011	Energy generation			Y	Y			
Carbon Trust (UK)	Low carbon buildings – Building refurbishment	2011	Comp			Y	Y			
Carbon Trust (UK)	Low carbon buildings – Commissioning building systems	2011	Comp			Y	Y			
Carbon Trust (UK)	Low carbon buildings – Managing refurbishments	2011	Comp	Y		Y	Y			
Carbon Trust (UK)	Low carbon buildings – Photovoltaics	2011	Energy generation			Y	Y			
Carbon Trust (UK)	Low carbon buildings – The gap between design and performance	2011	Comp			Y	Y			
Carbon Trust (UK)	Low temperature hot water boilers overview (CTV051)		Hot water			Y	Y			
OEH	Measurement and Verification Operational Guide - Best practice M&V processes	2012	M&V			Y	Y			
Energy Efficiency Exchange website (eex.gov.au)	Opportunities – Heating, ventilation and air conditioning		HVAC			Y	Y			

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Office of Environment and Heritage (OEH) / Australian Institute of Refrigeration, Airconditioning and Heating (AIRAH).	Optimising your heating, ventilation and air conditioning systems	2015	HVAC			Y	Y			
OEH	Solar Finance Guide	2015	Financing	Y		Y	Y			Y
Investor Confidence Project (ICP) (EU)	Standard Tertiary Energy Performance Protocol - FINAL	2015	Comp	Y						Y
Carbon Trust (UK)	Steam & high temperature hot water boilers overview (CTV052)		Hot water			Y	Y			
OEH	Sustainable Property Guide	2009	Comp	Y	Y	Y	Y	Y		
COAG	Tenant's Guide to Green Leases	2012	Leasing		Y			Y		Y
Rocky Mountain Institute (US)	The RetroFit Depot Guide - Guide to Building the Case for Deep Energy Retrofits		Business case	Y	Y	Y	Y			Y
Rocky Mountain Institute (US)	The RetroFit Depot Guide - Identifying Design Opportunities for Deep Energy Retrofits		Comp	Y		Y	Y			
Rocky Mountain Institute (US)	The RetroFit Depot Guide - Managing Deep Energy Retrofits		Management	Y	Y	Y	Y			Y

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ARUP/PCA	TOOL - Existing Buildings Survival Strategies	2009	Comp	Y		Y	Y		Y	
Carbon Trust (UK)	TOOL: Managing risk in low carbon buildings	2012	Comp			Y	Y			
City of Melbourne / 1200 Buildings	TRAINING COURSE - Blowing hot and cold HVAC seminar series	2014	HVAC			Y	Y		Y	
City of Melbourne / 1200 Buildings	TRAINING COURSE - Building management systems seminar series	2015	BMS			Y	Y		Y	
AIRAH	TRAINING COURSE - Building retro-commissioning for energy efficiency	2012	Retro-commissioning			Y	Y		Y	
AIRAH / Charles Sturt University.	TRAINING COURSE - Energy efficiency in HVAC operation and maintenance	2011	HVAC			Y	Y			
City of Melbourne / 1200 Buildings	TRAINING COURSE - Financing your retrofit – HVAC seminar series	2014	Financing	Y		Y	Y		Y	Y
The Australian Building and Quantity Surveying Alliance / UTS – School of the Built Environment and Energy Australia.	TRAINING COURSE - Introduction to energy efficiency in commercial buildings for Construction Professionals and Building and Quantity Surveyors	2012	Comp				Y			
City of Melbourne / 1200 Buildings	TRAINING COURSE - Introduction to retrofitting your building – seminar series	2012	Comp			Y	Y		Y	
GPT Group / Sustainable Business Australia / AIRAH	TRAINING COURSE - Maximise energy efficiency in commercial buildings	2011	Comp			Y	Y		Y	

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City of Melbourne / 1200 Buildings	TRAINING COURSE - Retrofit financing and incentives - HVAC seminar series	2014	Financing	Y		Y	Y		Y	Y
City of Melbourne / 1200 Buildings	TRAINING COURSE - Retrofit your lighting – Energy Saver Incentive seminar series	2013	Lighting			Y	Y			
The Royal Institution of Chartered Surveyors and the University of Technology Sydney.	TRAINING COURSE - The value of green, energy-efficient buildings	2011	Business case	Y	Y				Y	Y
Energy Efficiency Exchange website (eex.gov.au)	Upgrade appliances, electronic, office, cooking and refrigeration equipment		Appliances	Y		Y		Y		
ARUP/PCA	VIDEO EBSS STEP 1 - Baseline	2011	Management	Y	Y	Y	Y			Y
ARUP/PCA	VIDEO EBSS STEP 2 - Targets	2011	Management	Y	Y	Y	Y			Y
ARUP/PCA	VIDEO EBSS STEP 3 - Review	2011	Management	Y	Y	Y	Y			Y
ARUP/PCA	VIDEO EBSS STEP 4 - Crunch Time	2011	Management	Y	Y	Y	Y			Y
ARUP/PCA	VIDEO EBSS STEP 5 - Optimal	2011	Management	Y	Y	Y	Y			Y
ARUP/PCA	VIDEO EBSS STEP 6 - Conclusion	2011	Management	Y	Y	Y	Y			Y
CitySwitch	Why choose a high-performing building		Leasing		Y			Y		Y

## APPENDIX 3: National Mid-tier Pathway and BRT alignment

GBCA item	GBCA Action	BRT
1. <b>Develop a robust and trusted evidence base</b>	1.1. Conduct further research into the number, size, grade, location, energy performance and equipment condition of mid-tier commercial buildings in Australia	B1-1.
	1.2. Conduct further research into the ownership structure, management approach and tenant profile of mid-tier commercial office buildings in Australia	B1-2.
	1.3. Compile a national knowledge scoping study and tools gap analysis	Completed Building Retrofit Toolkit (BRT) Scoping Study
	1.4. Investigate the potential benefits of successful policies, programs and initiatives that could be applied to or adapted for mid-tier commercial buildings.	
	1.5. Draw on modelling tools to analyse the impact and likely outcomes of potential energy productivity initiatives. E.g. CSIRO diffusion model.	
	1.6. Conduct further research into the link between efficient buildings with good indoor environment quality and tenant wellbeing and productivity.	
2. <b>Build a compelling and quantified business case</b>	2.1. Develop and compile case studies and data sets	D2-1 E2-3 E3-5
	2.2. Develop information about building life-cycle costs in relation to energy efficiency upgrades.	E3-2.
3. <b>Create a shift in awareness, knowledge and behaviour</b>	3.1. Mid-tier definitions and phrasebook: Develop a phrasebook about mid-tier buildings that promotes common definitions, and enables stakeholders to speak the same language.	D2-1
	3.2. Building on the outcomes of the BRT Scoping Study, develop a tailored, comprehensive package of interventions that includes tools, information and facilitation to support mid-tier office building owners achieve best practice energy performance and promote through trusted sources.	F2-2

GBCA item	GBCA Action	BRT
	3.3. Consider disclosure options for smaller office buildings (currently not covered by the Commercial Buildings Disclosure program): This could be achieved through lowering the current CBD program threshold of 2000m <sup>2</sup> , or a voluntary scheme.	
	3.4. Educate facility managers, contractors and other mid-tier service providers about energy efficiency and technologies so that they can proactively influence owners.	C2-1 (partially) F2-1 F2-2
	3.5. Maximise opportunities to engage with and provide relevant information to owners and stakeholders at critical decision making points in a building lifecycle such as lease expiry, equipment lifecycle, changes to regulation and legislation.	F2-2
<b>4. Develop and identify tools to promote improved energy performance</b>	4.1. Develop a user review app for buildings that will allow people to rate and compare buildings in which they work against metrics such as comfort, natural light, fresh air etc.	
	4.2. Raise awareness and promote the use of existing tools such as NABERS, Green Star, Calculating Cool, LEASA app.	D2-1
	4.3. Develop a best-practice MOU template that gives owners and tenants more confidence to work together to achieve better outcomes for their building. The Better Buildings Partnership is developing an exemplar MOU that could be promoted widely.	E3-1
	4.4. Promote existing green leasing resources to mid-tier stakeholders.	D2-1
	4.5. Include information about indoor environment and improved employee productivity as part of Work Health and Safety (WHS) considerations.	
<b>5. Establish representative bodies and networks</b>	5.1. Work with existing industry bodies to target the mid-tier sector and if necessary, establish a national representative body as a central and trusted source of information and resources.	F2-2
	5.2. Establish a sector network or forum to bring together key stakeholders to increase collaboration, innovation and exchange.	A1-2 (partially)
	5.3. Establish a Regulatory Working Group for identifying regulatory changes required (e.g. Minimum Energy Performance Standards for appliance and equipment, building standards and the CBD program).	
	5.4. Collaborate with local councils, industry bodies and training providers to develop and deliver useful, nationally-consistent information.	A1-2

GBCA item	GBCA Action	BRT
<b>6. Promote innovative financing mechanisms</b>	<p>6.1. Promote a range of financing mechanisms to encourage upgrades/retrofits. E.g. accelerated depreciation, rebates, low interest loans and Environmental Upgrade Agreements.</p> <p>6.2. Develop support mechanisms and approaches (e.g. deeming methods for HVAC and lighting) to assist mid-tier buildings to access funding programs such as the Emissions Reduction Fund or state-based white certificate schemes.</p>	D2-1