National Framework For Sustainable Government Office Buildings

Guidance Paper:

Integrated Energy Efficiency Retrofits and Energy Performance Contracting

ENERGY EFFICIENCY COUNCIL inc.

GPG Government Property Group

Government Property Group
Integrated Energy Efficiency Retrofits and Energy Performance Contracting

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FOREWORD

In 2009, the Government Property Group (GPG) released its National Framework for Sustainable Government Office Buildings (the Framework), which united Australian state and territory governments under a single commitment to addressing sustainability in government properties. As users of over four million square metres of office space, the potential of the Framework to contribute to national sustainability targets is significant.

The Framework establishes six core principles, each with a set of specific initiatives, that GPG members apply in the use and management of government property around the country. One such initiative has been to promote the use of energy efficiency retrofits - specifically energy performance contracting - as a means of improving the cost effectiveness and efficiency of government office buildings.

To achieve this, the GPG has jointly developed and released this paper with the peak body in the energy efficiency industry – the Energy Efficiency Council (EEC). This guidance paper, which draws on the EEC's significant knowledge and expertise in this field, establishes a clear rationale for using integrated energy efficiency services, including energy performance contracting, in governments' plans to improve the energy efficiency of their properties.

Furthermore, it examines the experiences of various governments that have successfully used integrated energy efficiency services and applies that knowledge to the development of a simple and practical protocol to assist with the cost effective upgrade of government portfolios.

The GPG and EEC are proud to jointly release this paper, which represents an important step in the ongoing collaboration of governments and industry to collectively manage the environmental impacts of government property use and realise emerging economic opportunities in the energy efficiency sector.

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March, 2011

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March, 2011

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1. SUSTAINABLE GOVERNMENT BUILDINGS

This paper presents a business case for investment in energy efficiency in buildings that are owned or leased by governments (e.g. offices, schools and hospitals).

Improving the efficiency of energy and water use in government buildings allows governments to achieve significant cost savings and meet environmental goals. Projects in Victoria, Queensland, Germany and the US have demonstrated substantial benefits to governments and individual agencies.

There are three main drivers for governments to improve the efficiency of their properties:

i) Reduce government expenditure

ii) Create local employment and the capacity to deliver efficiency in the private sector

iii) Meet community expectations and existing environmental targets

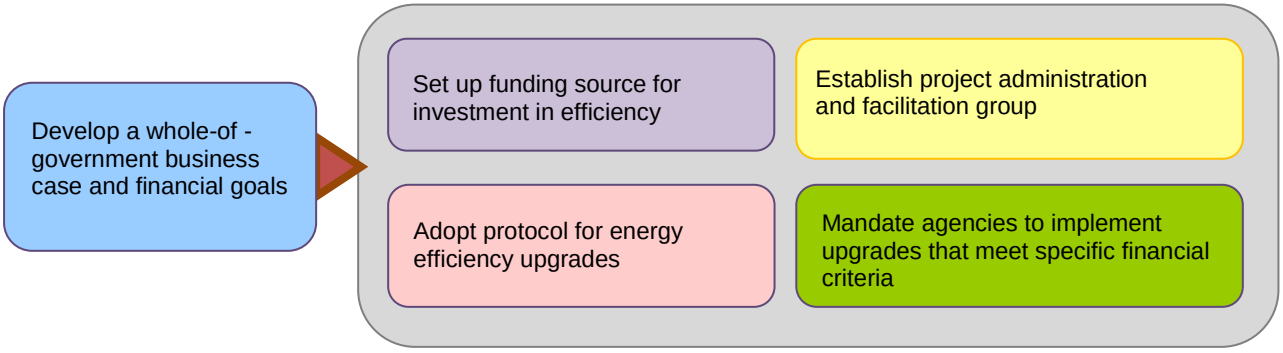
Australian governments collectively spend around $1 billion each year on energy and water, with the Commonwealth alone spending $450 million per annum[1]. These costs are expected to rise significantly over the coming decade as energy prices increase. Governments can typically reduce energy use and greenhouse gas emissions in their buildings by 25 per cent with an annual return on investment of 7 to 15 per cent. The Victorian Government projects that its energy efficiency projects will save $1 billion over 25 years.

Government investment in energy efficiency also creates jobs and builds the capacity of the energy efficiency sector. Government investment in energy efficiency gives energy service providers the certainty they need to invest in hiring and training specialists. Energy efficiency investments also have a significant local economic multiplier effect. Studies by the US Department of Energy estimate that each dollar invested in energy efficiency generates US$2.32 in local economic activity, US$0.84 more than an equivalent expenditure in petroleum and gas bills.[2]

Upgrading the efficiency of government buildings is critical to meet community expectations. Governments occupy 32 per cent of Australia's commercial building stock and their actions can deliver substantial greenhouse gas reductions and catalyse change in the private sector. Most governments in Australia have set targets for improving the efficiency of their buildings, including the Commonwealth, South Australia, NSW, Queensland and Victoria.

Despite some progress, many governments are failing to meet their targets, largely because energy efficiency is given a low priority and governments are using ad hoc or unsuitable contracting models. Global evidence suggests that traditional energy efficiency procurement models have limited success. In contrast, US governments have invested over $21 billion in energy efficiency through low-risk, proven energy efficiency procurement models like Energy Performance Contracting.

This paper draws on global experience and recommends five key components for an energy efficiency program:



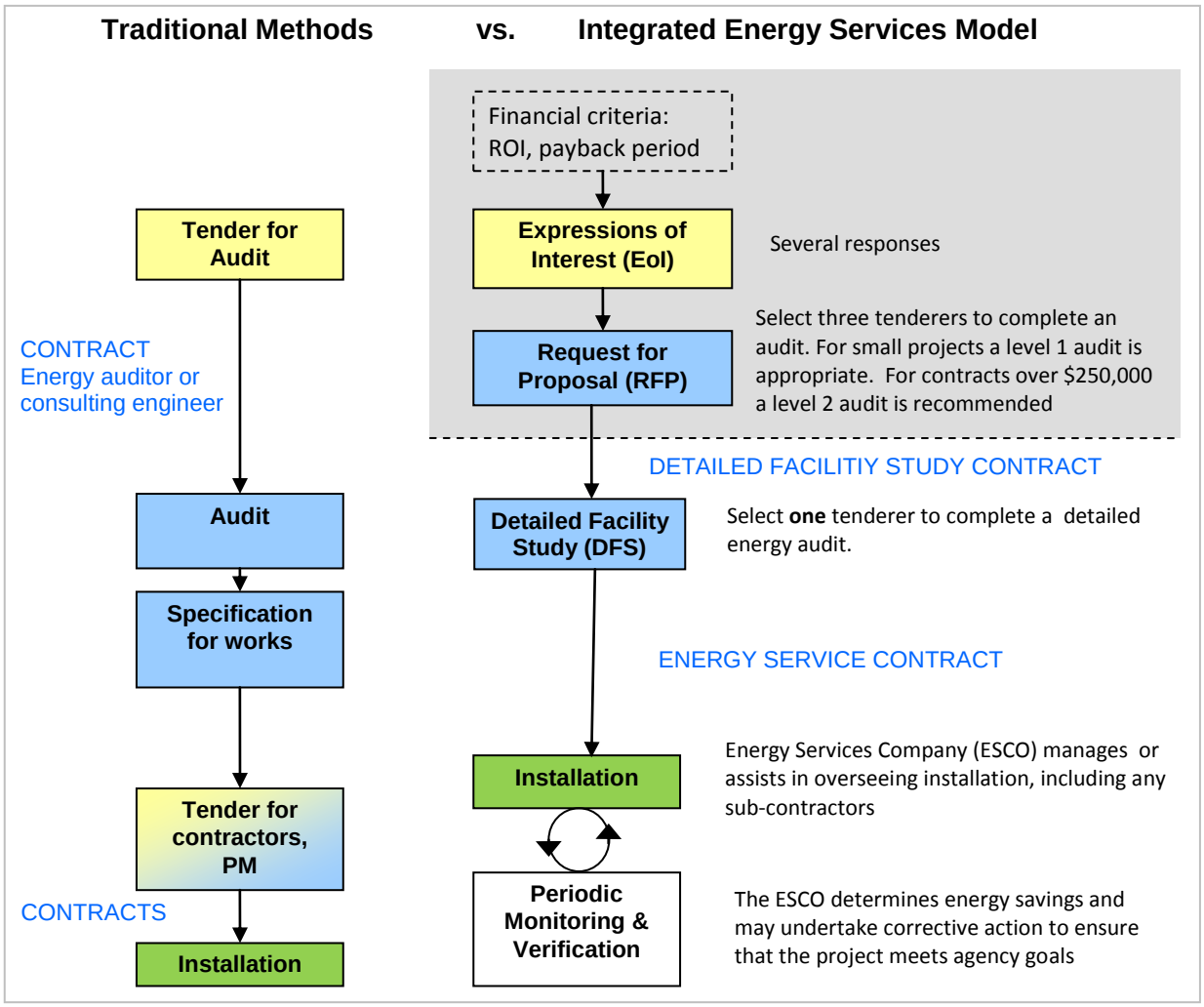
[1] Australian National Audit Office 2009, *Audit Report No.25 2008–09: Green Office Procurement and Sustainable Office Management*, Australian National Audit Office, Canberra.

[2] National Renewable Energy Laboratory 1995, DOE/GO-10095-196, Energy Efficiency Strengthens Local Economies, U.S. Department of Energy, Washington

2. INTEGRATED ENERGY SERVICES MODEL

Extensive Australian and global experience has demonstrated that establishing the right funding structures and using integrated service models are critical if governments are going to improve their energy efficiency. Conversely, progress will be extremely limited if governments use traditional methods for contracting and funding energy efficiency.

Governments in Australia have historically approached energy efficiency improvements by engaging the services of several contracting businesses with limited success. The alternative approach uses an 'integrated energy services model', where governments tender for a lead service provider to design, install, optimise and manage energy upgrades. These approaches are contrasted below.



Traditional methods

The traditional way to deliver energy efficiency upgrades (on the left) generally involves:

- A government agency procures an energy audit from an engineering consultant or specialist auditing firm.
- If the audit identifies significant opportunities, the government agency then seeks funding from central agencies. The project often stalls at this point.
- If the agency secures funds, they then hire contractors to undertake or project manage the works. Once the works are implemented the project ends.

Integrated Energy Services Model

The Integrated Energy Services process (right) instead focuses government effort on developing a whole-of-government protocol and selecting a lead contractor:

- The government establishes a whole-of-government protocol for energy efficiency upgrades. This includes establishing access to capital for energy efficiency upgrades that meet a pre-determined return on investment (ROI) target, typically between 7 and 15 per cent per annum.
- An agency seeks expressions of interest (EOIs) from energy service companies (ESCOs) covering their competencies and previous experience
- The agency selects three ESCOs to undertake an initial, and free, assessment of energy efficiency opportunities (a 'Request for Proposal' (RFP)). Based on these assessments, the agency selects a preferred ESCO.
- The successful ESCO undertakes a detailed assessment of energy efficiency opportunities (a 'Detailed Facility Study') and presents the agency with a set of measures that they guarantee will deliver a certain level of energy savings.
- If the agency agrees to proceed, the ESCO implements the energy efficiency upgrade and may provide ongoing management of these measures. Alternatively, the ESCO may assist the agency to hire subcontractors to implement the upgrade and help the agency develop a management plan.
- The ESCO or an independent auditor will monitor and verify the energy savings. This provides a level of surety of actual performance outcomes.

Ideally, the contractor and agency form a close partnership with a shared goal to maximise ongoing energy and cost savings. There are a number of options within this type of Integrated Energy Services model, including Energy Performance Contracting (EPC). EPC has the additional benefit of ongoing maintenance and guaranteed energy saving results, with the ESCO underwriting shortfalls in savings if the project does not achieve the agreed objectives. However, in some cases other forms of integrated provider contract may be more suitable (see p6).

Benefits of Integrated Energy Services

An Integrated Energy Services approach has several advantages over traditional methods:

- Agencies are not required to be an 'expert' in energy or water efficiency to decide on the project scope. The agency simply specifies a 'hurdle rate' in financial terms (generally a maximum payback period, or minimum ROI). This rate may be determined by a financial adviser, CFO, or by standard investment policies.
- Agencies can select their contractor by comparing the initial assessments (RFPs) provided by three different ESCOs. This comparison may consider energy reductions, financial savings and goals such as achieving specific NABERS star ratings. This competitive audit process has been proven to identify substantially more opportunities than a conventional audit. Under the traditional approach agencies have to select contractors on cruder indicators of quality, such as price and reputation.
- An ESCO both designs and helps to implement energy efficiency upgrades and can be held responsible for the results, unlike auditors. ESCOs can therefore guarantee the outcomes, substantially reducing risk to the customer. Under and EPC, ESCOs have a contractual requirement to reimburse the customer if project goals are not met.
- The ESCO can assure performance outcomes over several years, such as energy savings and NABERS ratings.
- Once the agency has selected the ESCO its workload is substantially reduced, as the ESCO designs the upgrade, implements the work and takes responsibility for sub-contractors.
- EPC projects are sometimes implemented using third party finance to meet capital costs, using projected energy savings to repay the loan.

As a result, Integrated Energy Services are the preferred method of implementing energy efficiency upgrades in governments that have achieved significant energy and cost savings, including Victoria,

Queensland and Germany. In the US alone governments have invested over $21 billion in EPC between 1996 and 2006.

Limitations of Energy Performance Contracting (EPC)

EPCs are most effective when used for implementing relatively large projects (i.e. over $250 000 in value). EPCs may be deemed unsuitable in contexts where an EPC would be:

- Unmarketable due to limited size or remote location which may deter ESCOs,
- Inappropriate or complex - e.g. due to a number of separate entities unable or unwilling to be grouped or managed by a department, or
- Unnecessary - e.g. a specific solution with limited suppliers is sought

In these instances, non-EPC projects such as energy audits may be deemed more appropriate, though it is recommended that similar outcomes be sought by applying concepts such as measuring and verification and supplier performance accountability to prove that the savings were achieved.

Government Owned Properties and Tenancies

Most governments own or control a large property portfolio that consumes substantial power. This energy use has substantial budgetary impacts. Schools and hospitals are generally the largest energy consumers, often accounting for over 50 per cent of a government's energy spend. As a result, energy efficiency programs covering these classes of building will generally deliver the largest financial and environmental benefits to governments.

Where a government agency owns a property, they can use an EPC or similar approach to retrofit the entire building (including tenancy lighting and base-building services). Even if the agency subsequently sells the property they will obtain a substantial return on investment as the sale value of the building will be enhanced by the retrofit.

Where an agency leases a building, the suitability of an integrated energy service contract will depend on the length and nature of the lease. In all instances agencies have the option of negotiating with the building owner to encourage them to fund and implement a comprehensive retrofit.

If the agency leases an entire building and has more than 7 years remaining on the lease, the agency can directly fund a comprehensive retrofit with the permission of the building owner. If an agency only leases part of a building, or has between 3 and 7 years remaining on a whole-building lease, they may carry out a retrofit just on the tenancy power. This is generally just the tenancy lighting, but may include supplementary air-conditioning. Tenancy upgrades deliver smaller energy savings, but generally have shorter payback periods.

3. FINANCIAL CASE FOR ENERGY EFFICIENCY UPGRADES

A government-wide energy efficiency upgrade process would deliver the following financial benefits:

- Direct cost savings from reduced energy use
- Avoided future costs through reduced exposure to electricity price rises

The diagram below shows a hypothetical energy efficiency project and illustrates the benefits that accrue over time through investment in energy efficiency initiatives.

The upper curve shows the business-as-usual (BAU) case which shows the cost of supplying energy to a certain facility. In this scenario, costs are increasing over time in line with current forecasts of growth in energy consumption and increases in energy tariffs. At the start of year 1, an energy efficiency contract project is implemented, cutting the site's energy consumption by 30 per cent.

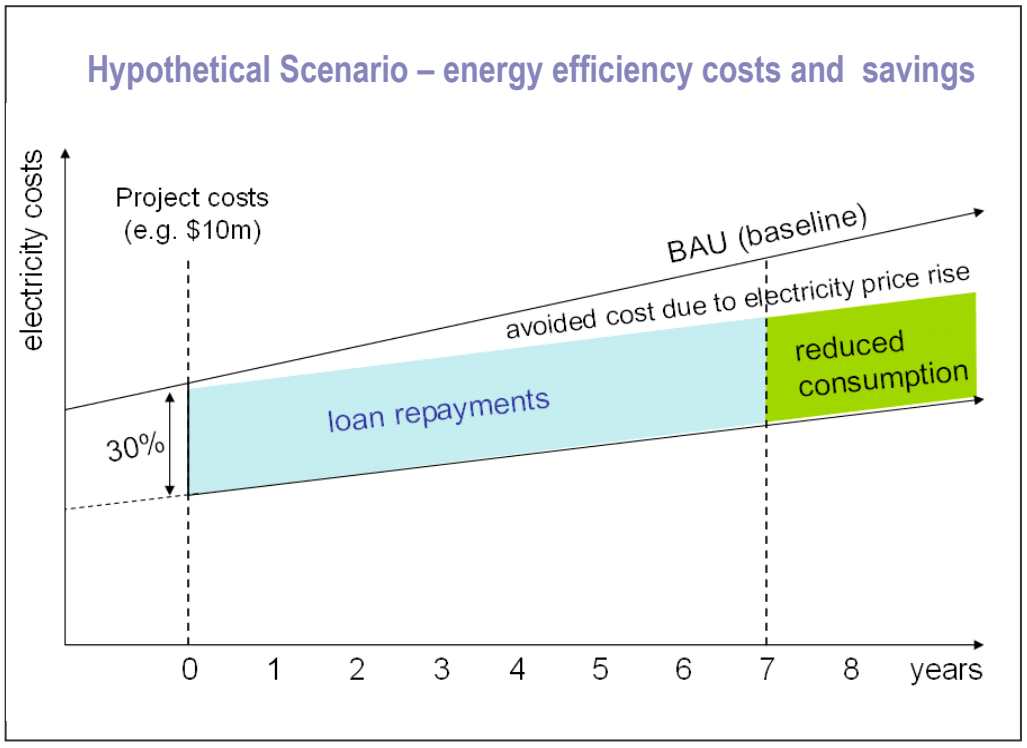


Figure 1: scenario depicting the energy costs of a hypothetical facility

For illustrative purposes only, it is assumed that the capital cost of the energy efficiency contract is $10 million, with 30 per cent savings on energy costs guaranteed by the ESCO over a payback period of 7 years (i.e. direct cost savings delivered by the project accumulate to the value of the initial expenditure over seven years).

In this example there is a cost saving of $1.43 million every year to the customer through reduced energy use, which accumulates to $10 million over the seven year payback period. Energy savings are guaranteed under the project at the current energy price (i.e. year 1 prices). These savings are reflected in the blue area of the chart as the 'loan repayments', as the energy savings are used to pay back the initial investment required to undertake the project. Once the loan has been repaid, these funds are then available for other purposes.

The green area represents the net recurrent annual savings realised beyond the payback period for the project, as energy use for the facility will theoretically remain at the reduced level (i.e. at 70 per cent of the BAU cost) in perpetuity.

Both the blue and green areas refer to a 'real' cost saving to government (i.e. money that can be used by the customer for other purposes). The white area directly below the BAU line represents the costs

'avoided' through reducing energy consumption (i.e. energy price increases that are **not** required to be paid). This is the cost attributable to energy use had the EPC not been initiated (i.e. BAU).

Case Study – the Victorian Government.

The Victorian Government estimates that its Greener Government Buildings Program will deliver benefits of $430 million over 25 years[3]. These savings will consist of:

- Direct energy savings: $297 million Present Value (PV) of cost savings from reduced expenditure in the event that energy prices remain at 2009 levels
- Indirect energy savings: an additional $133 million PV in cost savings due to projected increases in energy prices

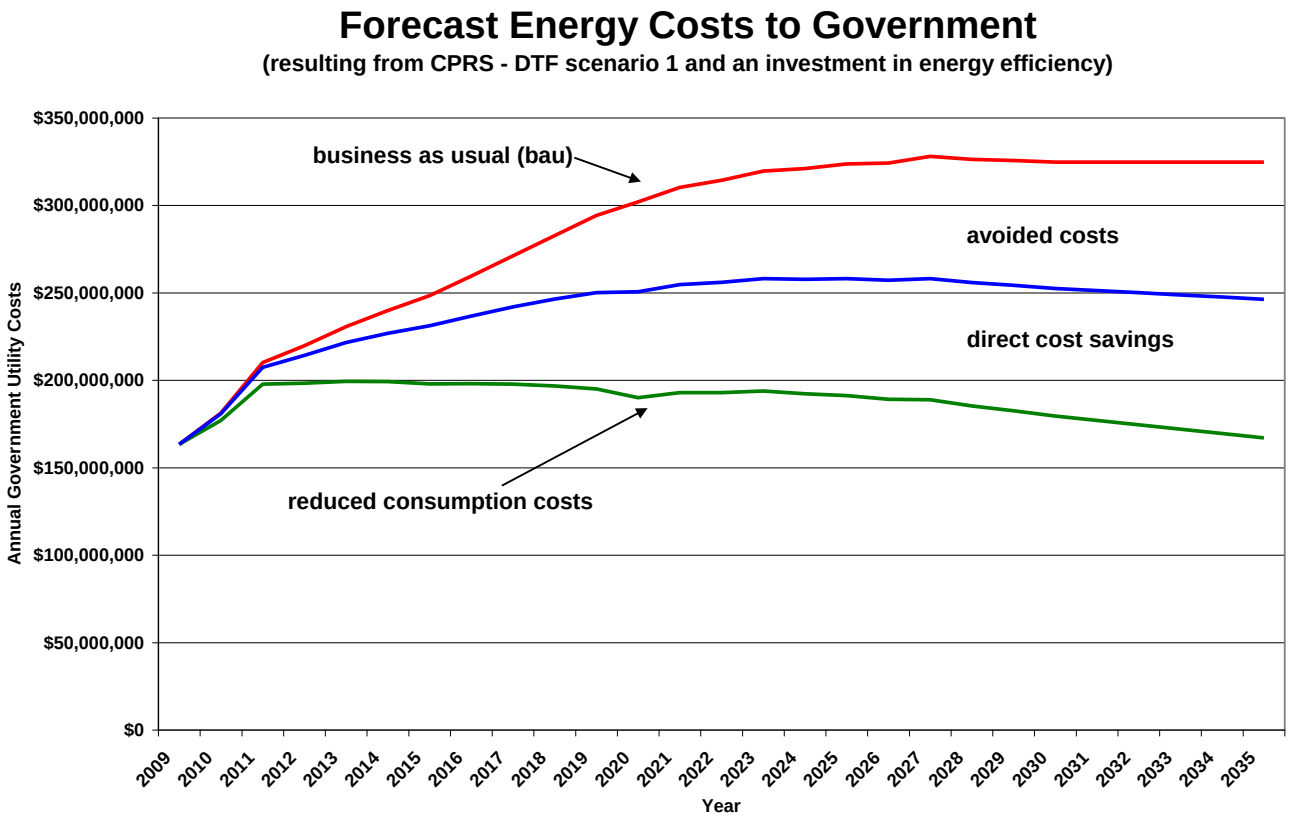


Figure 2: forecast electricity costs to government

Cost of delay

Delaying action on energy efficiency upgrades incurs substantial costs, as governments lose potential energy savings. The Victorian Government estimated that if it delayed its new Greener Government Building Program by just one year it would have cost the Government $21 million (NPV). Similar work in the US found that agency budgets would be in a worse position if they delayed action on energy efficiency, even if early action meant that they had to use private capital with a higher interest rate than Treasury loans.

[3] Information provided by the Victorian Department of Treasury and Finance

4. SOCIAL, ECONOMIC AND ENVIRONMENTAL BENEFITS

Alongside substantial financial benefits, a well-designed energy efficiency upgrade of government buildings will deliver substantial environmental, social and economic benefits.

The community increasingly expects governments to play their part in reducing Australia's greenhouse gas emissions. Comprehensive energy efficiency upgrades will typically reduce emissions from government properties by 20 to 30 per cent, and deeper reductions are possible if governments adopt return on investment (ROI) targets below 10 per cent for their capital investment threshold.

Most governments in Australia recognise the community expectation and have set greenhouse gas or energy efficiency targets for their operations. For example,

- The Commonwealth Government's *Energy Efficiency in Government Operations* policy sets targets to reduce tenant light and power to 7,500 MJ per person per annum, and to reduce central office energy use to 400 MJ per m^2 per annum.
- The NSW Government has set a target to "*reduce emissions from energy use in government-owned or tenanted buildings to 2000 levels by 2019-20."*
- South Australia's Strategic Plan has set a target to "*improve the energy efficiency of Government buildings by 25 per cent from 2000-01 levels by 2014".*
- The *Strategic Energy Efficiency Policy for Queensland Government Buildings* requires individual government departments to *"reduce their energy consumption by 5 per cent below 2005-06 levels by 2010, and 20 per cent by 2015."*

Global and local evidence indicates that governments will be unable to meet these kinds of target if they use ad-hoc approaches that lack a clear process, a streamlined financing system and a mandate for government agencies to implement efficiency upgrades.

As governments occupy an estimated 32 per cent of Australia's commercial building stock, energy efficiency programs in government occupied buildings are also expected to catalyse a much wider change in the private property sector. Building owners are already starting to respond to government demands for more energy efficient rental properties, even if they don't currently have government tenants. ClimateWorks estimates that a comprehensive upgrade of private-sector commercial buildings could save the economy over $1 billion a year by 2020 and reduce emissions by 10 Megatonnes a year.[4]

The push for energy efficiency in government operations will also create local jobs and support the development of an energy services sector in Australia. Governments can announce substantial long-term investment programs in energy efficiency, which provides the certainty that industry will need to continue to invest in recruiting and training energy efficiency specialists. Studies have indicated that the Victorian Government's *Greener Government Building* program will create around 250 new (green) jobs in Victoria alone[5].

Investment in energy efficiency has also been demonstrated to have regional economy-wide benefits. As energy efficiency upgrades involve substantial on-site works, investment in energy efficiency activities has a large local economic multiplier effect. Research in the US found that each dollar invested in energy efficiency generates US$2.32 in local economic activity, US$0.84 more than an equivalent spend on natural gas and petroleum product bills[ii].

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[4] ClimateWorks Australia 2010, *A Low Carbon Growth Plan for Australia*, ClimateWorks Australia, Melbourne.

[5] Victorian Department of Treasury and Finance website. Accessed on 14 October 2010. http://www.dtf.vic.gov.au/CA25713E0002EF43/pages/dtf-projects-greener-government-buildings

5. CASE STUDIES

Victorian Government

The Victorian Government commenced its *Greener Government Buildings Program* in 2009. The program aims to save $1 billion in energy and maintenance costs over a 25 year period and reduce emissions from government buildings by 20 per cent by 2020. The program is a comprehensive, government-wide program that applies to all agencies, and includes:

- A simple government-wide protocol for energy efficiency upgrades (the EPC process)
- Loans for agencies to implement energy efficiency upgrades
- Establishing a facilitation unit in the Department of Treasury and Finance
- A mandate for all agencies to implement energy efficiency upgrades at sites accounting for 20 per cent of agency energy use by 2012 and 90 per cent by 2018.

The program commenced with a trial EPC covering sixteen office buildings, and is now being rolled out across agencies, with $160 million allocated over the next 4 years. Decisions on additional funding to complete the program will be made in coming years.

Queensland Government

The *Strategic Energy Efficiency Policy for Queensland Government Buildings* requires individual government departments to reduce their energy consumption by 5 per cent below 2005-06 levels by 2010, and 20 per cent by 2015. The program shares some key features with the Victorian program, including the use of EPC and facilitation by a single department, the Department of Public Works. The Department of Public Works has so far invested over $20 million in improving the energy efficiency of 25 of the sites that it owns, and has reduced its energy use in those buildings by 18 megawatt hours per year.[6]

Case Study: Queensland Health

Queensland Health established a Carbon Management Unit in 2004. The Unit worked with energy and water experts to upgrade 18 sites, cutting emissions by 43,176 tonnes CO_2 per each year.

Queensland Health invested $1.2 million to reduce energy and water use at Logan Hospital. The upgrade cut electricity use by 19 per cent and gas use by 38 per cent. This saves the hospital $220,000 every year, an internal rate of return of 18.7 per cent.

Logan Hospital

United States

Federal, State, and local governments in the US have invested over $21 billion in EPC since 1996[7]. The US Federal Government's 2009 economic stimulus package included an additional $3.1 billion for efficiency in existing federal government buildings[8]. Federal and State governments have passed specific laws to facilitate EPC and accept up to 15-20 year payback periods. Research in the US indicated that EPCs have delivered general benefit to cost ratios of 1.6 to 1, with higher 2.1 to 1 ratios for EPCs in health facilities[9].

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[6] Information provided by the Queensland Department of Public Works

[7] Bharvirkar, R., Goldman, C., Gilligan, D., Singer, T., Birr, D., Donahue, P. and Serota, S. 2008 P*erformance Contracting and Energy Efficiency in the State Government Market*, LBNL-1202E, Lawrence Berkeley National Laboratory, Berkley CA.

[8] American Recovery and Reinvestment Act, 2009

[9] Hopper, N., Goldman, C. and McWilliams, J. 2007, *Public and Institutional Markets for ESCO Services: Comparing Programs, Practices and Performance, LBNL-55002* Lawrence Berkeley National Laboratory, Berkley CA.

6. UPGRADE PROTOCOL IN DETAIL

Importance of a comprehensive approach

Governments that have been successful at improving their energy efficiency have programs that share number of features. These include:

- A systematic government-wide protocol for improving energy efficiency using integrated energy services
- A lead agency to support and coordinate energy efficiency upgrades
- A source of capital for agencies to fund energy efficiency upgrades
- Mandates on agencies to upgrade the efficiency of their buildings

If energy efficiency programs lack one or more of these elements they will have the following disadvantages:

Higher administration costs	Some governments establish energy efficiency goals for agencies and leave them with discretion and responsibility for achieving those goals. Without a clear government-wide process, agencies have to invest more time and resources to develop ad-hoc proposals and secure funding.
Partial upgrades	Unless agencies are provided with sufficient capital and use an integrated service model, they will be limited to lower cost actions, such as lighting upgrades. This increases the installation costs for complete retrofits and limits the opportunity for deep retrofits.
Higher installation costs	Even if an agency follows up from a partial upgrade with subsequent actions, if engineers have to return to a site several times to design and install measures the costs are higher than if they undertook a single retrofit.
Losing the opportunity for deep retrofits	Cherry-picking lower cost actions can prevent companies from undertaking much more substantial retrofits because: • Installation costs are higher if actions are separated out, potentially making them uneconomic. • Integrated design makes more measures economic. For example, a particular type of light may be uneconomic on its own, but by lowering heat loads the lights could reduce the size and cost of any chiller units that need to be replaced.
Failure to achieve energy and greenhouse targets	Agencies generally won't take substantial action unless they have a clear mandate, clear process and timely access to appropriate funding. While agencies may take some action through the traditional government cyclical funding approach, they may lose the opportunity to undertake deep retrofits and will not achieve the more ambitious savings that are both economic and necessary to meet community expectations.

Recommendation 1: A Government-wide protocol

Administration costs will be substantially lower if there is a single protocol that all agencies follow to improve their energy efficiency. This protocol needs to establish:

- How agencies engage with ESCOs to undertake energy efficiency improvements
- Using an accreditation system for ESCOs that ensures that ESCOs have sufficient expertise to implement and maintain an energy efficiency upgrade. The Energy Efficiency Council is currently developing a national accreditation scheme that should come into operation in 2011.
- Systems to provide loans to agencies to undertake energy efficiency upgrades in their built assets.
- Monitoring/verification systems. These systems are critical to the success of a program in which a number of factors can influence energy savings (e.g. changes in staff numbers). It is strongly recommended that governments adopt the International Performance Measurement and Verification Protocol (IPMVP), which includes protocols to address these issues.

Recommendation 2: A lead agency

There are substantial economies of scale to be derived from having a single, expert unit within Government that assists other agencies in undertaking energy efficiency upgrades. For example, EPC contracts are relatively complex and ensuring that they are right in the first place is critical to their success.

The lead agency should generally be a central agency that has a whole of government focus and possibly an existing role in strategically managing government buildings. Appropriate agencies include Public Works, Treasury and Finance and Premier and Cabinet.

Recommendation 3: A source of capital

Agencies often lack access to sufficient available capital funding to pay for the upfront costs of energy efficiency upgrades. As agencies will not know how much capital is required until they have undertaken a Detailed Facility Study, cyclical budget processes are not ideal for energy efficiency retrofits. In particular, ESCO's subsidise detailed facility studies, which means that if an agency commissions a Detailed Facility Study, but does not secure funding to implement the retrofit, the ESCO will make a substantial loss.

The most cost effective solution is for a government to set up a simple process where an agency is guaranteed access to capital for an integrated energy service contract (e.g. EPC) if the Detailed Facility Study demonstrates that the project will meet a certain return on investment threshold. In the Victorian Government the threshold is 12 per cent.

Various arrangements have been put in place by governments to provide investment funding for energy efficiency works, including:

- The Victorian Government uses Section 37 of the Victorian Financial Management Act, which allows loans for self-funding projects.
- The Queensland Government has established a loan arrangement with Queensland Treasury Corporation for the funding of EPC.
- The NSW and ACT governments have established revolving funds.
- US governments allow agencies to directly borrow capital from the private sector to fund EPCs.

Loan repayments are normally made directly to Treasury or the private sector source of capital. Ongoing savings are normally kept by the agency, with Treasury applying an expected efficiency improvement dividend on all agencies, irrespective of whether they have undertaken the efficiency upgrade or not.

Recommendation 4: Mandates on agencies

Agencies generally focus on only those performance measures against which they are rated. As a result, they often put a low priority on matters such as energy efficiency. Experience demonstrates that governments need to place mandates onto agencies if they want to achieve government-wide energy saving goals.

Victoria has taken the approach to place a mandate on agencies' inputs (e.g. implement EPCs across a targeted percentage of sites by 2020), rather than agencies' outputs (e.g. achieve energy savings of 20% by 2020). The choice of target will depend on government's priorities. Output targets will give more certainty about energy and greenhouse savings. Input targets will generally deliver the best economic results, and although they may deliver more energy and greenhouse savings there will be less certainty about the scale of energy reductions.