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INTRODUCTION TO ENERGY PERFORMANCE CONTRACTING

Yves Lemoine

SUMMARY OF

ACTIONS TOWARDS SUSTAINABLE OUTCOMES

Environmental Issues/Principal Impacts

- Rising energy costs are creating an urgency for larger customers to reduce energy consumption.
- Energy efficiency and energy conservation in buildings and industry can result in direct and indirect greenhouse gas reductions.
- Waste reduction strategies can lead to real cost reductions.
- Energy performance contracting provides a service for the implementation of energy cost savings measures in buildings, where the savings are guaranteed against some measure of performance.

Basic Strategies

In many design situations, boudaries and constraints limit the application of cutting EDGe actions. In these circumstances, designers should at least consider the following:

- the integration of traditional design and cutting EDGe services with the performance contracting industry
- the development of energy and waste reduction actions, which are commercially viable and can be delivered on a guaranteed outcome basis
- delivery of a turnkey service from project development, design, construction and commissioning, to management of results and proof of savings
- the integration of technical services delivery with project financing, to simplify the project implementation and to structure the project such that the savings generated will repay the financing, over time.

Cutting EDGe Strategies

- Implement energy performance contracts with guaranteed energy cost savings:
  - guaranteed savings
  - shared savings
  - first-out; and
  - other contract forms can deliver desired results in a financially sound fashion.
- Take a practical approach to energy savings with a focus on results – high risk options rarely have a place in energy performance contracting.
- Integrate operational savings with technical solutions.
- Provide other non-energy related benefits such as equipment or building refurbishment, funded from savings of other measures, that meet intrinsic customer needs.
- Ensure sound measurement and verification techniques of results.

Synergies and References

- *BDP Environment Design Guide*: CAS 22
- Organisations such as the Australian Greenhouse Office (www.greenhouse.gov.au), NSW Sustainable Energy Development Authority (www.seda.nsw.gov.au), Sustainable Energy Authority of Victoria (www.seav.vic.gov.au), and others are promoting the use of energy performance contracting to achieve greenhouse gas reductions through energy savings, thus raising awareness of the potential impacts of this service
- The Australasian Energy Performance Contracting Association, the peak body representing the EPC industry, is actively promoting the concept of energy performance contracting and disseminates information on their website at www.aepca.asn.au. Member contractors and expert consultants in EPC can also be accessed through this website.

INTRODUCTION TO ENERGY PERFORMANCE CONTRACTING

Yves Lemoine

There is a growing need to reduce building operating costs and greenhouse gases for economic and environmental reasons. However, building owners are understandably apprehensive about implementing expensive changes without guaranteed outcomes. One option is to introduce building operating improvements through energy performance contracting. This note provides an introduction to energy performance contracting, its use by facility owners and the role of the building design professions.

1.0 INTRODUCTION

The engineering, architectural and equipment supply industries have for many years tried to provide services and products to building owners and operators which would result in better buildings and lower operating costs. Although successful to a limited degree, it has always been a struggle to convince owners and operators to implement projects that would save energy costs.

With the recent deregulation in the electricity sector, significant one-off price reductions occurred and owners and operators benefited from reduced operating costs as a result. This one-off price reduction resulted in an even tighter squeeze on the viability of energy cost savings measures. However, commercial and industrial electricity consumers are now seeing those price reductions erode with increases in energy costs of 10-30%, and concern is growing over the impacts this will have on operating budgets.

Energy audits have traditionally been the mechanism by which energy efficiency opportunities have been identified, however these audits have more often than not resulted in studies that "sit on the shelf and collect dust", rarely resulting in implemented projects. The reasons for this are varied, and include:

- lack of a commercial approach to the presented options
- lack of budget grade costing
- disconnection between the auditors and the implementers, resulting in frequently unrealistic and impractical proposals for implementation
- no final proposal for implementation
- requirement for considerably more analysis and design to complete the work and prepare for tendering and implementation of the project
- there is rarely a champion within the owner's facility who is inclined to take larger projects to the next step of project development
- lack of internal funds or lack of ability to sell the project internally on an economic basis; and
- lack of confidence that the results will be achieved.

Environmental stewardship is also becoming an increasingly important issue for business in Australia, due to domestic and international concern for our global environment. This is being driven internationally by the United Nations Framework Convention on Climate Change (UNFCCC), which is presently negotiating the Kyoto Protocol, and in Australia through organisations like the Australian Greenhouse Office, the NSW Sustainable Energy Development Authority, the Sustainable Energy Authority of Victoria and other state and local agencies.

The consulting, contracting and design profession as well as equipment suppliers have responded to these issues by developing the Energy Performance Contracting approach to the identification, implementation and guaranteeing of energy efficiency projects in a full turnkey approach. Originally developed in Europe and fine-tuned in the US and Canada over the past 20 years, energy performance contracting is a multi billion dollar industry worldwide and is now making inroads into Australia.

2.0 DEFINITION OF ENERGY PERFORMANCE CONTRACTING

Energy Performance Contracting, in its most basic form, is a turnkey service for the implementation of energy cost savings measures in buildings and factories, where the savings are guaranteed against some measure of performance. It is these two aspects, turnkey service and guaranteed performance, that differentiate performance contracting from other traditional design and construction services.

Firms that offer these turnkey performance based services are called Energy Service Companies, or ESCOs. Services offered by ESCOs typically include sales, project development, auditing, preliminary and detailed design, specification writing, equipment and trades procurement, construction management, commissioning, measurement and verification, and performance guarantees. The key attractiveness is the fact that all the services required for implementation of a project (including its identification and specification) can be managed under one contract and the risks associated with the savings not being achieved are borne by the ESCO and not by the customer.

In most ESCO contracts, known as Energy Performance Contracts (EPC) or Energy Services/ Savings Agreements (ESA), a savings level is guaranteed by the ESCO. Should the guarantee not be achieved, then the difference between the guarantee level and the actual savings is paid back to the customer (otherwise

known as Guaranteed Savings). The result, from the customers perspective, is that the cash flows for the project are guaranteed as well as the savings. Therefore, if project financing is required, the terms of an EPC can be structured so that the annual loan repayment is less than the guaranteed savings level, assuring a net annual benefit to the customer immediately from the project. At the end of the EPC term, the customer benefits from 100% of the savings from that point on.

The ESCO typically guarantees the energy consumption savings and not the actual monetary savings. This is because the actual energy rates charged by the utilities are out of the ESCO's control and therefore considered to be too high a risk for the ESCO to accept. The ESCO is willing to accept the technical risks of the energy consumption savings and, as long as rates remain constant or increase, the resulting energy cost savings will be achieved. Most customers accept this and, because historically energy rates have typically increased with time, they see the risks related to rate changes as low. Each EPC's terms and conditions are unique and the ESCO must evaluate its technical and financial risks and balance those against the marketing and sales objectives with each customer to determine precisely what the ESCO is prepared to guarantee and under what conditions.

ESCO projects typically involve two types of contracts – the EPC with the ESCO and the loan ggreement with the financial institution. In a developed ESCO market, the terms of the loan agreement benefits from the knowledge gained in the financial sector regarding the performance guarantees provided by the ESCO. As a result, the cash flow guarantees may result in better rates to customers.

3.0 TYPES OF EPCs

There are two basic types of EPCs, Guaranteed Savings and Shared Savings.

3.1 Guaranteed Savings

Under a Guaranteed Savings EPC, the ESCO guarantees a minimum level of savings for the term of the EPC and accepts most technical risks for the project. The customer on the other hand, must accept the loan repayment obligation if a loan is required to pay for the project implementation. The ESCO accepts no financial responsibility to the lender and the project's ability to secure financing is based on the project's economic return and, most importantly, on the customer's creditworthiness.

Under Guaranteed Savings contracts there are typically two agreements:

1. The EPC between the ESCO and the customer, which defines the scope of works to be carried out (equipment and services to be provided), the Performance Guarantees including the Guaranteed Savings amount, maintenance, measurement and verification, reporting, etc.
2. The loan agreement between the customer and the lender.

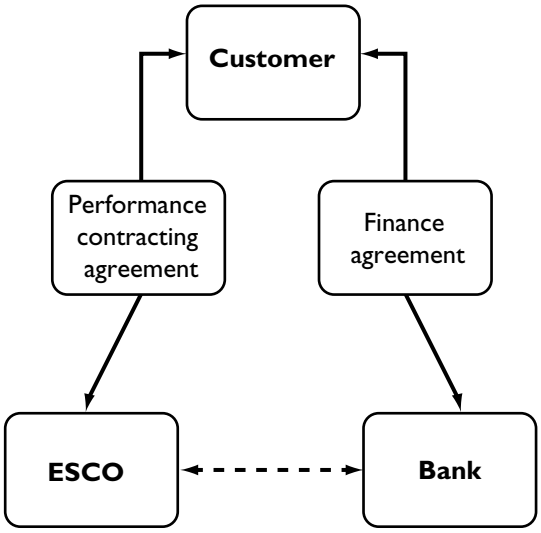

Figure 1. Agreement structure under Guarantee Savings

3.2 Shared Savings

While a Guaranteed Savings EPC splits the technical and financial risks between the ESCO and the customer, a Shared Savings EPC puts both technical and financial risks on the ESCO.

Although Shared Savings EPCs are not currently used in Australia, many ESCOs have the provision of offering project financing through affiliated or third party lenders. In these cases, the customer is still the borrower, not the ESCO, and the lending agreement terms will be set according to the creditworthiness of the customer, in much the same way as if an independent lender was used by the customer.

In a Shared Savings contract, the ESCO is the borrower and has an independent agreement with its lender for the funds for the project. This means that the ESCO maintains the loan repayment obligation and not the customer. Under this arrangement, the ESCO and customer's EPC provides for an agreed sharing of the resulting savings from the project and not a minimum guarantee. The amount and percentage of share which the ESCO receives is calculated on the basis of the ESCO meeting their monthly repayment obligation. If the savings do not meet expectations, then the ESCO must make up the shortfall from its own financial resources. If the savings exceed expectation, then the ESCO keeps the difference between its share and the loan repayment. This Shared Savings is typically a monthly payment by the customer with periodic adjustment based on results (quarterly, semi-annually or annually, depending upon the specifics of the project). If no savings materialise, the customer pays nothing. If there are savings, then regardless of how much is achieved the customer retains its agreed percentage and the ESCO receives the balance.

Historically, Shared Savings EPCs were seen as the saviour of project financing, because the ESCO was expected to provide both the technical and financial

solution for energy efficiency and accept most risks. Although initially the most popular type of EPC in the USA, it is not common any longer, and is not known to have yet been used in Australia. The reasons for its demise, despite its attractiveness to some customer groups, include:

- restricts the operations of ESCOs (except the largest) because of the added and accumulated burden of debt on the ESCOs balance sheet
- may make operating cost budgeting difficult if savings consistently exceed expectations and ESCO payments exceed planned customer budgets
- ESCOs found it difficult to marry the complexities of project financing with managing technical risk; and
- overall project costs are higher for this approach because the ESCO assumes more risk, which it must be compensated for.

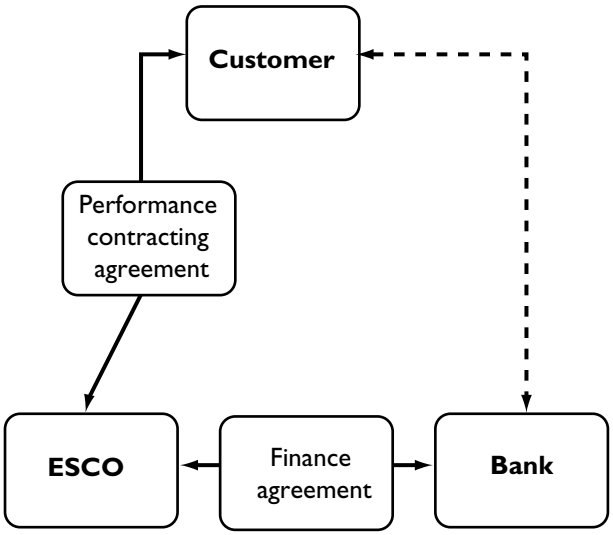

Figure 2. Agreement structure under Shared Savings

3.3 Other

Although the above two types of EPCs are the most relevant, there are nonetheless several variations worth noting. They include:

1. *Chauffage* In a chauffage agreement, the ESCO assumes full responsibility for the old level of energy bill and assumes responsibility for the operations, maintenance and system upgrades to achieve reductions in those bills. The customer continues to pay the previous bill amount to the ESCO, for an agreed period. Any savings achieved by the ESCO are retained by the ESCO. The main benefit to the customer is the eliminated need to invest in equipment upgrades and pay for maintenance. This is usually a full outsourcing of energy. This approach has fallen out of favour in most countries because the customer has little control over the ESCOs actions and there is a perceived or sometimes real inequity in the benefits to the ESCO, compared to those of the customer.
2. *First out* Here, all the savings from the project, less the ESCOs fixed fees, go to pay for the financing, so that it can be paid down at the fastest possible rate. Once the contract is paid out, the savings then revert back to the customer. The customer typically assumes the debt repayment obligation, as in a Guaranteed Savings EPC, and there would normally be a minimum Savings Guarantee. From the customer's perspective, this avoids excessive interest cost expenses for long contracts and avoids the additional costs which the customer may be subjected to for having negotiated a long contract under conservative savings, estimates by their ESCO. This contract type has been very popular with the public sector in Canada.
3. *Delivered energy* (sometimes referred to as Supply-side Contracts) Similar to Chauffage, Delivered Energy is the provision of a particular service to a required performance level and the customer pays for the delivery of the service, based on consumption or performance. For example, the ESCO takes over ownership and operation of a compressed air system and delivers to the customer compressed air, based on a pre-set performance agreement. The customer then pays for the amount of air consumed at an agreed upon rate ($/m^3) which would normally be at a cost lower than what the customer can currently produce this service, on a life cycle analysis. The same could be applied to chilled water, lighting, hot water, steam, etc.

4.0 PROJECT FINANCING

Financing is not what energy performance contracting is about. However, no EPC can be implemented without project funds and because of their size, borrowing is almost always the route a customer must take.

The typical options for EPC financing include:

1. *Customer internal financing* Here, the customer finances the project out of its own funds. This would be done where the customer is seeking a guaranteed return on investment and has access to capital or capital financing.
2. *Customer external financing* In this arrangement, the customer obtains financing via a third party lender. Options include:
   - a direct loan at the commencement of the contract to pay for construction as well as long term costs
   - a loan at the completion of construction to retire the ESCOs construction financing; or
   - a capital lease of the equipment.

3. *ESCO arranged financing* The ESCO can arrange financing in three basic ways:
    - ESCO finances the project directly using its own funds. This is convenient for the customer that doesn't have access to capital financing. However, it does disadvantage the ESCO by bringing debt onto its balance sheet and will be more expensive to the customer, as the ESCO is now accepting financial risk.
    - Taking out third party financing and assigning fixed payment of the performance contract to the lender. To protect itself, the lender will normally require that payments for the financing would be continued, regardless of performance of the contract or any contractual disputes.
    - Taking out third party financing without assigning payments. Because there is more risk to the lender in this case, there is usually a premium attached to the interest rate.

- measurement, verification and reporting of results *
- finance.

Note: Tasks marked with an asterix ('*') offer the potential for the design professions to be involved.

It is unlikely, in even the largest ESCO, that all these services will be provided in-house. Most ESCOs deliver EPCs through a network of strategic alliances, partnerships and subcontractors. The areas that normally remain in-house for risk management purposes are account management, overall project management, and reporting. All other areas can be outsourced, according to the ESCOs existing strengths, capability and delivery strategy.

To manage technical risks associated with outsourcing, ESCOs typically attempt to obtain "back-to-back" guarantees from subcontractors or suppliers that either cover the ESCO's guarantee to the customer, or a significant part thereof, in relation to the service provided. This is typically done with equipment suppliers and specialty contractors whose quality of work directly impacts upon the level of savings. Where these "back-to-back" guarantees cannot be obtained, the ESCO assumes the savings risk directly. Regardless of how the ESCO manages or defers its risks internally, they are always liable to the customer for the guarantee.

Table 1. Summary of key features of different financing arrangements (Bannister 1998)

Option	Advantages	Disadvantages
Client internal financing	Use of internal operating budgets, rather than capital budgets	Possible delays to project commencement; opportunity costs
Client external financing	Possibly lower interest rate than ESCO can source	No tax deduction on capital payments; debt on client balance sheet
ESCO internal financing	Improved tax deductibility for client	Possibly unattractive to ESCO due to accumulation of debt on ESCO balance sheet
ESCO external financing (client payment to lender)	Lower interest rates	Client exposure to risk of ESCO insolvency; possible debt on client balance sheet

5.0 STRUCTURE OF DELIVERING THE SERVICE

ESCOs offer a broad range of services that are tailored to the needs of the customer and the project. The range of services offered by a typical ESCO will include many of the following:

- marketing, sales and account management
- overall project management
- preliminary feasibility and opportunity identification *
- detail investment grade audits of facilities *
- design of energy efficiency options *
- engineering and architectural services *
- construction management *
- installation/construction services
- commissioning *
- operations
- maintenance
- training *

ESCOs outsourcing of specialty services is what creates the opportunity for the design professions to become involved in energy performance contracting. Few ESCOs can afford the overhead of maintaining specialty technical resources.

The most important issues for design professionals to be aware of when working with ESCOs are the following:

1. ESCOs accept a high level of financial risk at the project development phase and, therefore, are focused on structuring the best project, both technically and financially, for the customer in the least amount of time possible – design professionals must work to achieve this goal with the ESCO.
2. Focus on commercially proven technologies, systems and processes.

3. Only study or analyse options to the point which a "go" or "no go" decision can be made. Once this decision is made, further detailed analysis and design can be performed, but with the expectation that these options will now form part of the final offer to the customer in the EPC.
4. Integrate customer needs, other than energy savings, into the project if possible (e.g. equipment upgrades, building upgrades/ refurbishment, etc).
5. Work as a partner to the ESCO to achieve the joint goals of the ESCO and the customer.

The diagram below provides an overview of the process typically followed by an ESCO in the development and implementation of an EPC.

6.0 WHAT THE BUILDING OWNER NEEDS TO BE AWARE OF

Energy performance contracting is an excellent mechanism for implementing economically beneficial projects, because the customer is assured of the result through the guarantees provided by the ESCO. Unlike traditional contracting, where the final result is typically only assumed and based on engineering calculations, the EPC results are proven by the ESCO and guaranteed through the contract. This guarantee ensures that the customer has a guaranteed cash flow from the project and that that cash flow will at least meet the repayment obligations of the borrowing to implement the project. This almost always results in a net positive cash flow from the project on an operating cost basis.

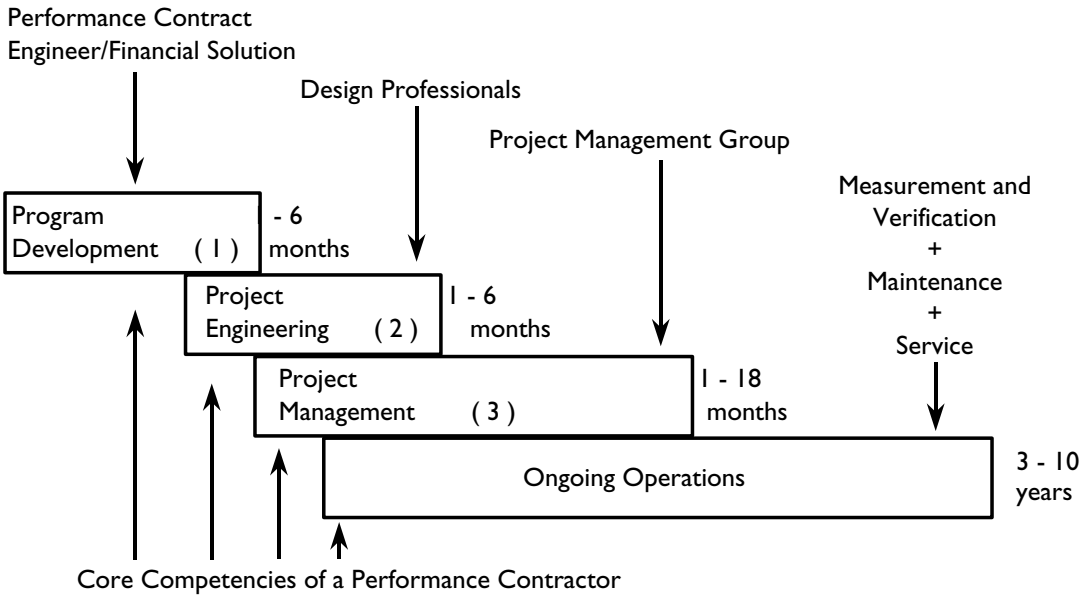

Figure 3. Life cycle of an Energy Performance Contract

Two important areas should be noted from this diagram. Firstly, that the project development cycle can be very long (up to 8 months) and, secondly, that the project term (referred to in the diagram as Ongoing Operations) can be up to 10 years or longer.

The ESCO's fees for the Program Development phase and part of the Project Engineering phase are usually paid for at the completion of a detailed facilities study. This fee is usually contingent upon the ESCO achieving certain financial and technical criteria within their study (e.g., minimum return on investment, minimum energy savings, maximum Net Present Value [NPV], etc). Should the study not achieve these criteria, the customer is at no risk to proceed and the ESCO may not receive compensation for their work. On the other hand, if the study does achieve the requirements, then the customer is expected to pay for the study and negotiate and sign an EPC. The study costs will either be paid at the conclusion of the study or rolled into the total project costs. The impact of this is that ESCO must accept the cash flow risk during the project's development.

Despite the advantages, there are some areas which all customers should be aware of.

1. The EPC process is new to most people and, therefore, there must be a commitment by the customer to investing the time and effort into the process to get it right. Most ESCOs will do their best to help in this education process, but there must also be a willingness by customers to contribute their time and effort to achieving the best possible result for their organisation.
2. Guaranteed performance and savings are one of the main benefits of an EPC, however there is little benefit in a guarantee if there is no trust in the manner in which it is demonstrated. Careful consideration should be paid to the development and negotiation of the measurement, verification, and reporting plan. It is this plan that will lay out the exact manner in which the savings will be quantified and demonstrated. The measurement

and verification plan is typically a balance between accuracy and cost, and a reasonable balance between these two items should be achieved.

3. ESCOs deliver a service and not capital, although the projects they manage obviously can provide capital equipment as a core part of their service. The basis of this service is a performance guarantee and the ESCO will require broad flexibility on how it is able to achieve that guarantee and maintain it over the term of the contract. If an ESCO sees that it will not be able to achieve its performance guarantee during the term of the contract, it will need to take action. Action may include modifications to measures, the installation of additional measures or, in extreme cases, decommissioning of measures – all normally undertaken at the ESCOs cost. The ESCO will almost always insist on this ability to ensure that it can achieve its guarantees. But, these types of options can typically only be imposed if all other service levels are maintained. For example, an ESCO could not raise zone thermostat settings above stated levels in an effort to reduce chiller consumption, just because a chiller retrofit implemented by the ESCO was not delivering the savings as expected.
4. The EPC is a relatively complex document that contains several components not normally seen in standard construction contracts. These include: Measurement and Verification Plan, Maintenance Plan, and other unique clauses and rights, which allow an ESCO to manage its risk appropriately and fairly. Also, because EPCs have two components, construction period and savings period, it is important to understand how the transition from one to the other will take effect, both contractually and in practice.

As energy performance contracting is new and time intensive to implement and understand, many customers have turned to external consultants to help them through the process. Experienced consultants can provide assistance with procurement (particularly important for public sector customers), review of the technical proposals, review of the measurement and verification (M&V) plans, assessment of the ESCO's final proposal, and a technical and legal review of the EPC. In addition to facilitating the negotiation of an EPC, consultants can also provide contract supervision, independent assessment of M&V reporting, independent M&V, and dispute resolution. A list of capable consultants is available at the Australasian Energy Performance Contracting Association (AEPCA) website (www.aepca.asn.au).

7.0 EPC IN NEW BUILDINGS

Up until now, the assumption has been that an energy performance contract is being implemented in an existing building. Although possible in new buildings, it is actually quite rare and to the author's knowledge, has not yet been executed in Australia.

The issue that makes energy performance contracting difficult in new buildings is the establishment of the baseline energy consumption – or in other words, "how much energy would I have consumed had I not implemented the energy efficiency measures?"

One approach to solving this dilemma is detailed energy simulation of the building's expected energy consumption, based on elaborate engineering modelling software results. To do this accurately requires:

- a very clear idea of how the facility and all its equipment and systems are expected to be used
- an energy simulation model and a skilled operator to perform the data input, simulation, and results analysis; and
- a well defined protocol on how post construction energy consumption will be compared to the base model analysis and how the base model will be adjusted depending upon changes in use or other factors affecting energy consumption.

The difficulty with this method is that most simulation models predict energy consumption to within 10-15% accuracy, and this is largely dependent on the skill of the analyst operating the program. If the savings anticipated by the measures implemented is smaller than this percentage of accuracy it may be difficult to identify the savings from differences in energy consumption caused by normal operational changes experienced in the building.

Also, because customers are unfamiliar with these programs, they may feel uncomfortable with a "black-box" approach to proving the performance of the proposed design. These are both issues which the design professions must work hard to overcome, if they choose to implement energy performance contracting in new buildings.

8.0 WHERE TO GET MORE INFORMATION

The Australasian Energy Performance Contracting Association (AEPCA) is the representative body for energy performance contracting in Australia. Its members include ESCOs, equipment suppliers, consultants and government bodies. The AEPCA has developed a number of documents to help develop the industry including:

1. National Standard Energy Performance Contract
2. Standard Detailed Facility Study Agreement
3. Best Practice Guide to Energy Performance Contracting.

All these are available for viewing or download at the AEPCA website (www.aepca.asn.au).

For independent assistance with energy performance contracting it is suggested that the reader approach one of the consultant members of AEPCA who can provide assistance in a number of areas including:

- EPC procurement
- opportunity assessment

- M&V review and operations
- contract review and negotiation facilitation; and
- education and training.

Additional information on energy performance contracting can be obtained from any of the suggested websites identified in the *References* section, at the end of this note.

9.0 CONCLUSION

The benefits of Energy Performance Contracting for customers are many, however to achieve them requires a desired perseverance to proceed with a new process. Performance contracting dispenses with the faults of the traditional auditing and tendering process and ensures that projects deliver on the contractor's promises with firm guarantees. Because ESCOs deliver a turnkey service requiring many different disciplines, there is an excellent opportunity for the design professions to provide services to this industry. Additionally, the economic benefits of an EPC can be supplemented by the environmental benefits of reduced greenhouse gas emissions, which can also be guaranteed. Overall, energy performance contracting is an economic and environmentally sustainable approach to energy and asset management, which should be evaluated by all building owners and operators.

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WEB SITES

Australasian Energy Performance Contracting Association
www.aepca.asn.au

National Association of Energy Service Companies (USA)
www.naesco.org

Canadian Association of Energy Service Companies
www.caesco.org

Japanese Association of Energy Service Companies
www.jaesco.org

Australian Greenhouse Office
www.greenhouse.gov.au

Sustainable Energy Development Authority of NSW
www.seda.nsw.gov.au

Federal Energy Management Program (USA)
www.eren.doe.gov/femp/femp.html

Federal Buildings Initiative (Canada)
www.oee.nrcan.gc.ca

International Performance Measurement and Verification Protocol
www.ipmvp.org

American Society of Heating Refrigerating and Air-conditioning Engineers
www.ashrae.org

United Nations Framework on Climate Change
www.unfccc.org

BIOGRAPHY

Yves Lemoine is Principal of Yves Lemoine Consulting and a Director of the Australasian Energy Performance Contracting Association (AEPCA). He has 18 years experience in energy management and climate change and has been actively involved in the development of the energy performance contracting industry in Australia and Thailand. He is a pioneer of the application of energy performance contracting in the NSW public sector and has facilitated the procurement and implementation of EPCs for several organisations. Yves Lemoine can be contacted via email at Lemoiney@attglobal.net.

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