Putting the yin and yang into performance contracting

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Keywords

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Abstract

Energy performance contracting is not common in Asia, where fast economic growth in many parts of the region during the last two decades has taken precedence over people's concern for energy saving. Explores how one particular group of facility managers introduced the concept of energy performance contracting in a context where bureaucratic tradition had always rewarded control rather than relationship development. Considers the roles and expectations of key players – the energy savings contractor, and the contracting organisation, who had both new style facility management and traditional maintenance staff working on the project. Discusses the issues that nearly derailed the project and how these were eventually overcome. Suggests there is a need for ongoing communication between all partners involved in energy performance contracting, both to overcome barriers to traditional ways of working and also to develop an appreciation for the differing objectives of each partner involved in the contract.

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Introduction

Energy performance contracting has been defined as:

> An agreement for the provision of energy services ... in which a person agrees to install, maintain, or manage energy systems in exchange for a portion of the energy savings or revenue (*New York Energy Law*, 1997).

The concept of energy performance contracting has been widely used in the USA and Europe for over 20 years but is only just beginning to surface as a relatively new approach to energy saving in Hong Kong and other parts of Asia. The emergence of energy performance contracting in the early 1980s was a response to the failure of traditional energy management techniques to achieve greater levels of efficiency. Those businesses which now offer energy performance contracting techniques assume both the technical and financial risks of installing the necessary facilities within an organisation by investing their own time and money in facility improvements and asking to be paid only out of a share of the resulting savings. This is known as "shared savings" or "performance contracting".

There are a number of financing mechanisms that an energy management service contractor (contractor) offers, usually based on the amount of energy saved. Two forms generally apply (Dee, 1997). These focus on the type of financial arrangement used to share savings:

(1) *Guaranteed savings agreement.* Payments are fixed for the term of the agreement based on an agreed estimate of energy savings. If measured savings are less than the guarantee, the contractor makes up the shortfall to the customer.

(2) *Shared savings agreement.* The contractor puts up the money for the project and generally owns the equipment. Payments are for a specified percentage of measured energy cost saving and if there are no savings, the customer makes no payment.

Energy performance contracting is not common in Asia, partly because the fast economic growth in many parts of the region during the last two decades has taken precedence over people's concern for energy saving. For example, prior to the Asian

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economic downturn in 1998 the controllable element for running a commercial building in Hong Kong was estimated to be as little as 10 per cent. Compare this to the USA and Europe, where the cost of running a building is probably 25-40 per cent of total occupancy cost (Jones, 1996). However, with property values coming under pressure in Asia, proportionate running costs are significantly higher. Hence, energy cost, previously taken for granted as a recurrent cost, has now begun to attract serious attention.

In addition, as Asian economies begin to recognise the dangers of ignoring the economic and social effects of non-environmentally conscious policies, a sea change in attitudes is also beginning to take place. In essence the Confucian concept of "yin and yang" – harmony between individuals and their social setting – is now being taken a step further to encompass the wider world of the business arena and its responsibilities towards conservation of natural resources. But this change is not easy, nor is it easily understood. It needs the combined forces of a government ready to push the concept for change, and a willingness of professionals to challenge their old ways of thinking to secure such a change.

Organisations interested in significantly lowering energy costs usually face serious hurdles. Energy efficiency improvement projects are typically expensive, technically complex and may not immediately produce savings equal to their installation costs. In addition, air-conditioning and other equipment in many organisations operate at wasteful levels of efficiency. This is often due to an inadequate capital replacement budget. Management may also be unwilling to take the risk of engineering, financing, and managing a complex energy conservation programme without guaranteed cost savings. Finally, many old type operations and maintenance departments frequently lack either technically competent staff or staff willing to initiate such work.

So, how can organisations, facing a push from their national governments to speed up energy conservation measures, be persuaded that typical "band-aid" responses only create short-term savings? What can staff responsible for energy facilities do to bring costs and energy protection more into balance with the precepts of "yin and yang"? This paper seeks to explore how one particular group of facility managers introduced the concept of energy performance contracting in a context where bureaucratic tradition has always rewarded control rather than relationship development. In the process, implications for other facility management professionals working in what Lee Kwan Yu has called "societies with an unpromising start [but] promising future" (Lee Kwan Yu, 2000), will be highlighted and examined.

The case study

The number of energy performance savings projects to date in Hong Kong has been quite small. However, as cost control becomes increasingly important in Hong Kong's nascent eco-conscious climate, facility managers are beginning to look for non-traditional ways to save money in an attempt to meet the Government's stated aim of reducing operating expenditure (Tung Chee-Hwa, 1998). One such area is energy conservation. A major consumer of energy worldwide is the health care sector. The Hong Kong Special Administrative Region is no exception. In Hong Kong, hospital administrators have calculated that energy costs can constitute 3-10 per cent of a hospital's budget, although it was estimated as long ago as the early 1980s that with energy conservation measures in place, these figures could be reduced by a factor of 20-40 per cent in most hospitals (General Accounting Office, 1982).

But it was not until 1994 that energy conservation activities were first launched in public hospitals in Hong Kong. The main focus then was on regulating and reducing energy consumption through staff awareness and good practices. For example, a *Good Energy Conservation Practice Guide* was issued to all hospitals during the mid-1990s. In 1998, the Hong Kong Hospital Authority launched a staff awareness campaign on energy conservation. These activities helped to raise overall staff consciousness and invited their participation in conserving the use of energy. As a result of these initiatives, an estimated 5 per cent of energy cost reduction accrued (Wan, 2000).

More recently, focus on individual hospital initiatives has given way to combined projects where the hospital authority is progressively implementing energy conservation measures

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in 14 hospitals with the technical support of the Hong Kong Government's Electrical and Mechanical Services Department (EMSD). Such measures include:

- Intensive de-lamping of lighting fixtures in common areas and corridors.
- Manually setting ventilation systems to operate at slower speeds.
- Revising operating schedules of some ventilation systems.
- Shutting off re-heat systems.
- Shutting down 60 per cent of domestic hot water calorifiers.
- Manually sequencing chiller plant operation.

According to the EMSD, these schemes have contributed to an overall savings of around HK$3.2 million per annum since implementation. But such savings are a pitifully small amount compared to the overall hospital authority energy budget of HK$500 million per year (Capital Works Policy Paper, 1999).

So in 1997, a pilot scheme to implement a guaranteed savings contract was introduced in the Pamela Youde Nethersole Eastern Hospital (Eastern Hospital). The Eastern Hospital serves a population of approximately 600,000 with 1,835 beds employing 3,000 hospital staff members within a total hospital floor area of 150,000m^2 on a land site of ten hectares. The hospital also acts as a role model in the health care arena within Hong Kong, being charged with introducing new technologies and innovative projects into its management system as a pilot for other public hospitals. Consequently, working in partnership with a local contractor, the Eastern Hospital developed a comprehensive energy management scheme. The contractor guaranteed an annual 12 per cent energy cost reduction for a six-year period. This was equivalent to a cost reduction of ~HK$5 million per annum for the six-year period based on a total energy cost of HK$55 million in 1997, the benchmark year. In addition, the contractor would provide the necessary expertise and capital for incorporating energy savings equipment, and the hospital would repay the capital from the energy cost savings, within the agreed six-year saving period. However, if the guaranteed amount could not be met, the contractor agreed to fund the deficit. The hospital and the contractor also established:

- a method for calculating saved energy;
- an implementation schedule for all phases of work;
- priorities for the modifications and retrofitting of equipment; and
- the need to install a computerised energy management system (see Table I).

Preparing the groundwork

Overcoming traditional work practices and creating new relationships within established structures is frequently fraught with tension. The Eastern Hospital's energy savings initiative was no exception, and a tremendous amount of adjustment, co-ordination, persuasion, and creativity was required during the initial stages of the project. In the case study, initiating an alliance contract involving three parties, the hospital, EMSD and the contractor was very difficult. The contractor and EMSD staff had to confront attitudes and behaviours that characterise traditional contractual relationships. But in the project one of the crucial parties, the EMSD, was not actively involved in the contract agreement discussions prior to signing the original contract in December 1997. Such an omission has since been recognised as a mistake that led to a potential derailment of the overall scheme. Because EMSD staff had

Table I Scope of work of the energy performance contract

Strategy No. 1	AHU ventilation system modification
	VFD installation
	CO_2 sensors installation
	Occupancy sensors installation
	Humidity sensors installation
Strategy No. 2	Lighting system modification
	Electronic ballasts and T8 lamps installation
	Reflectors installation
Strategy No. 3	Chiller plant modification
	Automation sequencing
	Chilled water supply temperature reset
Strategy No. 4	BAS control strategy modification
	AHU operating schedule revision
	Outdoor air damper control
	Space air temperature set point reset
	Supply air temperature set point reset
	Night purge control
Strategy No. 5	Heating plant modification
	Hot water circulating pumps scheduling
	Isolation valve installation
Strategy No. 6	Reset discharge air temperature from AHUs

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been in charge of services before the introduction of energy performance measures, they were naturally upset not to have been consulted regarding the new scheme within which they were supposed to co-operate with the energy performance contractors. These difficulties were exacerbated by problems from within the contractor's team. For example, following the signing of the agreement in 1997, all directors and engineers who were part of the negotiating team to the original agreement either resigned or were transferred within the contractor's company. Naturally, this too hindered the establishment of trust and teamwork during the project implementation process, reducing operational efficiency during the energy improvement works.

In addition, there is always the potential for conflict between those staff running the essential services of an organisation – in this case nurses, doctors, technicians, porters, etc. – and staff charged with implementing the introduction of energy saving measures. In any project the art of knowing how to give and take, how far to push and how much to concede, is essential both for facility managers and the contract staff. Creating fixed time spans for work completion, whilst theoretically sound, tends to produce tension if there is no flexibility built into the agreement. Hospitals, like many other organisations, are a 24-hour 365-day operation. Retrofitting facilities with state-of-the-art heating, ventilation, air-conditioning and lighting systems is a delicate affair. At the Eastern Hospital, the project was carried out in and around a fully active workforce – one subject to constant changes, emergencies, high stress and the usual mundane daily tasks of caring, feeding, testing, moving, admitting and discharging patients. For example, most of the lighting retrofit work was undertaken at weekends or overnight; air-conditioning chiller plant replacement was made in the winter. This was one area in the case study where, because retrofit work was accomplished with minimal disruption to the hospital services, potential tensions were defused. However, what had not been anticipated was the amount of time that would be required to complete the retrofit operation that in turn delayed commencement of the effective guarantee date (see Table II).

Finally, one of the toughest problems to be overcome when negotiating an energy performance contract is the establishment of a mutually agreeable base year of energy consumption for calculating energy savings. For example, the original contract was signed in 1996. But between 1996 and 1999 (when the guarantee effective date started), many major activities and incidents occurred which affected energy use. These included:

- The number of hospital beds increased from 1,463 to 1,835.
- A total of 11 new hospital wards were opened.
- A total of 2,800 additional items of medical equipment were acquired.
- A pneumatic tube system was introduced.
- In-patient food services were improved with the introduction of a "chill cook system".
- The weather was unseasonably hot during the April 1999-March 2000 period, the first full year of operation of the agreement.

All these occurrences caused extra energy resources to be used that had not been predictable when the original 1996 baseline conditions were discussed. It therefore became very difficult for the hospital management and the contractor to mutually agree baseline adjustments which both recognised as necessary to avoid the contractor being burdened with huge deficit payments. Changing circumstances that take place during the initial implementation stages of an energy performance contract have the potential to unravel "intent" agreements if there is not the will and understanding to recognise the need for readjustments. With the Eastern Hospital project, a new agreement was eventually reached after an energy audit for both the chill cook system and the pneumatic tube system were undertaken; enumerating all new medical and office equipment and estimating their likely energy consumption; and finally making adjustments to the base period to reflect anticipated energy usage patterns with respect to normal weather conditions and future billing periods. But even with these new agreements in place, the contractor still had to pay HK$0.65 million to the hospital for a net shortfall (Table III).

Table II Schedule of operations between the hospital and the contractor

Date	Activity
September 1995	The hospital signs a "letter of intent" with the contractor
January 1996	The contractor completes in-depth engineering study
June 1996	Hospital authority issues RFP for energy management services at the Eastern Hospital
September 1996	Contractor selected to carry out comprehensive energy audit in the hospital to establish "energy usage base year", leading to contractual agreement
December 1997	Formal energy performance contract signed between the hospital and the contractor
January 1998	Retrofitting works commenced. Bi-monthly meeting with hospital EMSD staff and the contractor, chaired by the hospital general manager (administrative services)
March 1999	Majority of retrofitting work completed
April 1999	Guarantee effective date commenced, i.e. 60-month

Table III Energy saving measurements

	Estimate (HK$ million)	Remarks
Base Year (September, 1995 to August, 1996), excluding multi-centre block	44.5	Charges at 1999/2000 utility rates (kWh and kVA)
Guaranteed savings under performance contract (PC)	6	Revised figure excludes town gas saving ($0.47 million) and operational saving ($0.45 million) Charges at 1999/2000 utility rates (kWh and kVA)
Total load growth (1995/1996 to 1999/2000)	3.5	
Target electricity charge under PC	42	D = A – B + C
Hospital's electricity charge for PC areas (1999/2000)	44.3	
Shortfall for the first year guarantee saving (1999/2000)	2.3	F = E – D
Pre-guarantee saving (January 1998 to March 1999, 15 months)	1.65	Revised based on actual progress of energy retrofit works as agreed with the contractor
Shortfall to be borne by the contractor	0.65	H = F – G

From control to partnership

Performance contracting guarantees savings and, therefore, results. Yet the contract itself is no guarantee that the results will be achieved. Many of the problems experienced when trying to secure services for energy efficiency performance contracts are rooted in the idea that performance contracting is a technical solution. In fact, performance contracting lives or dies on the sense of partnership achieved. The success of the contract depends on how effectively the contract team and the client's staff work together (Henderson, 1990). Omitting key players from discussions, discontinuity or change of key players, ignoring the needs and wishes of staff "on the ground", refusing to acknowledge changing circumstances can all seriously affect the successful implementation of a project. The case study points to a strong need for an alliance relationship that must be developed and managed carefully from the very beginning in order to avoid animosity, and potential failure. Success needs to be based on sharing of common goals with a high degree of dependency. Each partner must believe in the mantra "I cannot succeed if you do not". Such a commitment contributes significantly to a strong desire for mutual co-operation especially in the case of adversarial problems occurring.

Planning is a primary mechanism for creating a common set of goals. It is a dynamic process that involves all parties who will be working together. Personal experience of the case study research (Wan, 2000) indicates that operations and maintenance personnel – those generally already part of the organisation and responsible for maintaining facilities – should be active participants in the effort from the initial stages of the energy performance contract and should receive a steady flow of information as the project moves forward. Otherwise traditionally minded operations and maintenance staff,

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steeped in cumbersome bureaucratic structures and processes, may resort to tactics of "transactional style relationships" in dealing with "incomers" into an organisation. Staff used to a well-defined role within a corporate structure can feel both challenged and threatened when new methods and techniques are introduced into their departments. As a protective measure they may adopt "arm's length" relationships with outside contracting employees charged with implementing new schemes. When the project "happens", the degree of prior involvement of facility personnel will have a major impact on results good or bad.

Alliance management is, however, a very new and difficult concept for the traditional manager to grasp. The key concept is to let go of the operational activity and to begin building the alliance relationship. But unravelling bureaucratic mindsets, unconscious habits, and "normal" behaviour – hitherto defined as "good management practice" – is a difficult task. Establishing alliances takes considerable work and time. It is also complex. Various cultures within the relationship, different chemistries, and even different languages between different service providers, have to come together over time. The need for stability is important. The team not only has to be able to build and sustain personal working relationships, but it also has to develop an organisational memory. In this respect if the relationships and individuals involved in managing a partnership change constantly, the ability to bring past discussions and commitments to bear on a current decision is at risk. So although implementing an energy programme requires changes in past practices, changes that are often resisted, changes throughout the implementation process can also create tensions for the success of the project.

The binding force in energy management and performance contracting is communications – the ability to communicate the necessity for energy conservation and the opportunities that are available to all in the organisation to contribute to such savings. This requires ongoing attention to communications between all partners, both informal and formal links. Employees of an organisation may very well be concerned over the potential loss of control of their work environment on a day-to-day basis. For example, staff are generally used to being able to control their own space temperature in common areas, such as in hospital wards, waiting areas, offices and general store areas using wall controls. But in energy savings programmes, space temperature is often set to specific standards that cannot be individually changed. Consequently, staff may become disgruntled if they think their needs are being ignored and new practices are downgrading their personal liberties. So, only after consultation with the hospital staff were agreed temperatures set at 25.5°C (+1-1°C) in summer, and 20°C (+1-1°C) in winter in the patient areas; and between 20°C to 24°C for laboratories and critical areas such as the intensive care unit and operating theatres.

The host organisation and contractor's management must also be aware of the potential difficulties that can arise if either chooses to ignore or fails to recognise the needs of their employees when introducing new energy practices. To allay these concerns, all parties must contractually establish acceptable comfort conditions – temperature parameters, lighting levels and air exchange to ensure a quality environment – with those who will be most affected by the changes. Developing good employee communicative interaction is one aspect of a performance contract that costs little and gains much. One of the greatest ironies is that planned communication can be the most cost-effective tool in energy management, yet it is often relegated to an incidental, haphazard approach. The result is that not only are communication strategies too often insufficient or misplaced but months of "forethought" can be wrecked within days by direct action or withdrawal of goodwill from staff on the ground.

Conversely, bringing all parties to the negotiating table in a true spirit of partnership and co-operation can develop the willingness and potential for change. At the Eastern Hospital, eventual inclusion of the EMSD in negotiations saw a greater willingness of staff to move from controlling activities to mutually establishing and co-managing new processes. As such changes gain momentum, as new roles are defined, and as historical practices are forgotten, staff gain confidence to work with, rather than confront, the alliance partner within the new structure. A good alliance relationship is not managed by the contract, but by a strategic framework embracing total quality management. The

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legal contract should only be viewed as a starting point for negotiation and not as the end point where failure to deliver on commitments by either party is seen as only "resolvable" through litigation. All parties must recognise the need for manoeuvrability as new factors come into play within the implementation period and before the final effective guarantee date. The final contract should aim to outline well-defined goals, expectations, compensation and measurement processes and benchmark baselines. But it should also leave room for flexibility to accommodate new and inevitable challenges.

For any alliance to be successful, there has to be the ability to view the alliance as an extension of organisational services and not as maintaining the traditional client/vendor mindset. Renegotiation has to be part of the understanding of energy performance contracting. In the case study, at the time of the original contract it was estimated that measured savings would accrue as follows:

- 509KVA electrical demand (per month);
- 7,395,811KWh electrical consumption;
- 60,862 CCF town gas consumption.

This would have been equal to a utility cost savings of approximately HK$6 million, based on 1996 utility rates, and an estimated operational saving of ~HK$0.45 million, and a total cost savings of ~HK$6.45 million equivalent to ~12 per cent of the then current annual hospital energy expenditure. In actual fact, a final contract sum of ~HK$27 million was agreed after renegotiation, a 30 per cent reduction over the original contract sum. In traditional contracting, refusing to move on binding agreements often leads to litigation and projects may never be completed. But energy performance contracting thrives in an environment of change and flexible attitudes. To be successful there needs to be a will to develop new forms of interpersonal skills and to create teams capable of solving traditionally deep-rooted (and sometimes hidden) behavioural mindsets and bureaucratic entrenchment.

In this respect, there is an urgent need for more research into the impact of cultural values, differences and core beliefs as these affect facility management contracts. Many common axioms and principles that drive US and north European facility management, for example, would appear to run counter to current Asian management practices (Gilleard, 1999). But the extent to which facility management practices are adapting and/or developing their own particular form of branding within Asian and other global regions is only gradually emerging. At the same time, outsourcing aspects of facility management, often to companies who have little appreciation of cross-cultural differences, creates its own kind of conflicts. These issues are only just beginning to be understood but the sooner they are put firmly on to the research agenda, the better will facility management professionals and their clients achieve "yin and yang" within their contractual agreements.

Conclusion

Performance contracting is a new business approach in energy management both in Hong Kong and in many other parts of Asia and societies are just beginning to recognise the need for greater energy savings within their environments. The concept is sound, but putting the "manage" into energy management requires effective leadership not prescriptive control, a willingness to try out new ideas rather than remain entrenched in traditional operations and maintenance practices, and above all a recognition that trust, rather than confrontation between partners, is the best way forward. In other words the real difference between an effective energy programme, and one that is not, is the attention paid to developing relationships, innovation and imaginative practices.

But an alliance partnership brings substantial change to any organisation. This needs to be communicated and managed aggressively but not in an aggressive manner. The Confucian legacy is one "primarily concerned with social order" (Herbig and Martin, 1998); harmony is important in social relationships and between the individual and nature but individuals do not necessarily extend such thinking to the organisation and its immediate environment. Here employees used to receiving authoritative directives and being part of cost cutting rather than revenue generating organisational cultures may find change to more flexible working practices and eco-friendly policies difficult to accept and handle. At the same time, new practices may be seen as a form of criticism of old traditional

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styles of management and working, and many employees may feel they "lose face" by accepting such new methods. All these factors can build up resistance to change (Wilson and Wilson, 1999).

The key is to communicate intentions to, and involve, all interested parties from the very beginning of the energy saving process. A critical first step with staff is to affirm the good things they have been doing but seek to explain the "why" as well as the "what" of their role in energy efficiency. Care must also be exercised to assure personnel that the new energy effort is not a threat to their jobs. Performance contracting can have many valuable "hidden" benefits that need to be made clear to staff. For example it can often free up time for preventive maintenance work that may have had very little priority in old working systems. Without gaining an understanding and the commitment to help from operations and maintenance employees, even the most sophisticated control system or elaborate management plan will almost certainly fail.

The role of the project leader in energy performance contracting is therefore a crucial one and may be exemplified by the term "change master" (Wan, 1999). The project leader is the catalyst for implementing change, and as such he/she is a target for the resistance that often accompanies the change process. Bureaucratic traditions which reward professionals for leading through authority rather than persuading through partnership will never be able to face the challenges of new developments within facility management. The transfer of non-core services to external suppliers, the search for private sector expertise and finance, the integration of employees to provide complete solutions create huge opportunities (Jones, 1996) but also a huge demand for innovative and culturally sensitive facility managers. The case study challenges FM professionals to question old ways of behaving and leading if they are to succeed with new ways of saving energy. To be technically competent, to work long and often difficult hours, to hide behind traditional cultural norms all are no longer good enough for those seeking to improve and manage facility services within organisations.

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