ESCOs and In-house Energy Managers: A Winning Team

Bruce Colburn, Ph.D., P.E., C.E.M.
EPS Capital Corp., USA
Rahul Walawalkar, M.S., C.E.M.
EPS Capital Corp., USA

ABSTRACT

Over past 25+ years, energy service companies (ESCOs) have emerged as a successful way of carrying out energy efficiency improvements in industrial and institutional facilities. At the same time, facilities are entrusting their energy manager (EM) with the responsibility of reducing energy costs without fail However, this is often not accompanied by investment capital or people support from management, or at least not in proportion to the task assignment. One channel of supporting the EM is through use of ESCOs in forming a "partnering" arrangement to reduce both facility operating costs as well as provide for infrastructure needs without new capital outlay approvals by the corporation, and doing this rapidly. To make this partnership a success, EMs and ESCOs need to complement each other by bringing their respective strengths to bear on a potential energy cost savings project. The EMs can help in optimizing project planning and the swift corporate approval process, and the ESCO can bring focused expertise at practical energy efficiency opportunities suited to the client, and a keen focus on swiftly completing measures for the mutual benefit of the owner and the ESCO. This article addresses the EM/ESCO partnership, along with a recent successful case study.

INTRODUCTION

With increasing awareness about the economic and productivity benefits of energy management and implementation of various regulations, more and more organizations are trusting their energy manager (EM, should they have one so designated, or the facility manager) with both the authority and responsibility for controlling and/or reducing energy costs. The energy price variations, especially in natural gas recently, can cause the actual total costs to increase, but less than otherwise would have occurred due to aggressive control of energy usage and competitive price arrangements with energy suppliers. The cost control is usually accompanied with strict reduction or cost control goals. However, this is often not accompanied by associated investment capital (or at least it must compete with other production or related capital fund expenditures) or people support from upper management. This then gives rise to the dilemma of performing very short payback O&M measures only (because they are cheap), or of seeking alternate means to finance and implement meaningful energy savings projects, which will achieve the corporate energy and cost reduction goals. In some cases, these energy reduction goals are also accompanied by new guidelines on greenhouse gas emission reductions based on publicly promised corporate objectives to support good citizenship.

One means of accomplishing these objectives is through use of a qualified ESCO which acts in partnership with the needs of the organization and utilizes the ESCO's ability to develop, finance, and implement energy cost savings projects. During the past couple of decades, ESCOs have emerged as a successful way of carrying out energy efficiency improvements in industrial and institutional facilities for the benefit of facility owners. Part of the reason for this is that the ESCO's sole income stream is normally the successful implementation of energy cost reduction projects, and as such the ESCO puts a keen focus in that direction. Additionally, in the case of many institutional facilities, years of neglect and lack of capital have simply led to a need to perform infrastructure upgrade in order for the facility to continue to perform its intended function. In such facilities (typically schools and hospitals), the issue of energy cost savings only matters as regards it being the financing mechanism; net free cash flow to the owner is generally not a serious consideration in these cases.

Generally, an EM has only a few options available as to how cost

savings work will be implemented. Although there are many variations, they generally fall into the following categories:

1. Use in-house staff (if available) and carry out the energy conservation measures (ECMs).
2. Engage engineers, and bid out work, and finance the project internally through their capital allocation process.
3. Engage a local design/build contractor, and pay with normal allocated funds, if any.
4. Purchase a vendor product and have in-house maintenance personnel install.
5. Contract with an ESCO to support the in-house expertise.
6. Surprisingly, "do nothing" and maintain the "status quo" is one alternative.

This article is focused on those aspects associated with a project in which an EM has done most of what he and his team could do internally, and has chosen to utilize the services of an experienced ESCO to further support the aims and goals of the organization in optimizing operating costs and improving the work environment. In practice, an ESCO is not only looking at energy cost savings, but any and all real operating cost reductions that can be directly attributed to the ESCO work. In the experience of the authors, this is best accomplished when an owner and his representatives have already been pro-active, are familiar with the implementation process, and have determined that due to time, budget constraints, and lack of internal resources a fresh, outside approach can bring all the missing elements together for successful implementation.

POTENTIAL

The best means of accomplishing this is through forming a partnership between the EM/owner and the ESCO in such a way that both parties can reap the benefits. Typically, the ESCO would offer the EM the following services [1]:

- develop, design, and finance energy efficiency projects;
- install and maintain the energy efficient equipment involved;

- measure, monitor, and verify the project's energy savings [2];
- equipment maintenance and servicing;
- assume the risk that the project will save the amount of energy guaranteed; and
- sometimes other specialized technical help (monitor indoor air quality, evaluate electricity and gas purchase options, provide electricity or gas, emission trading, removal & disposal of hazardous material etc.).

These services would then be bundled into a project's cost and be repaid through the savings generated. As a quality ESCO seeks projects that are comprehensive (i.e. as large as is practical within the contract criteria), potentially the largest practical group of measures will be evaluated that could bring maximum economic value to both parties. The type and level of ESCO services would be negotiated to fit the particular needs of the EM and the work, covering who would do installation, maintenance, and be responsible for overall operating responsibilities.

To make this partnership a success, EMs and ESCOs complement each other by bringing their strengths to the project. No single party in this partnership can likely achieve the same results without the specialized skills of the other party. Sometimes people tend to assume that since ESCOs offer the specialized domain knowledge, they alone are responsible for achieving the results. We wish to highlight the importance of the value accruing to using the strengths of both parties in this section.

The In-house EM Team Can Bring:

1. Optimized project planning by providing circumstances for past decisions, operational limitations that can affect acceptance or success of a measure, insight to upper management decision criteria, and free access to key people within the organization.
2. Single point of contact for the owner, and the responsibility for success of project.
3. Organized database of equipment and O&M activities (normally).
4. An in-house "champion" to aid in obtaining approval of upper management for implementing project.
5. Involvement in evaluation of the measures to insure owner acceptance that measures are practical and not just paper ideas.

6. Assurance that the measures have a proper O&M aspect and the in-house team is properly trained.
7. A pro-active teammate to the ESCO, who investigates and experiments ("real world simulation") for optimizing the performance or troubleshooting.

ESCOs can bring the following strengths to the table:

1. Its focused expertise of the latest technological advances as well as practical energy efficiency opportunities suited to the client.
2. Independence in evaluating upgrade options (without bias towards existing vendors/contractors) as well as consideration for the coupling effects of different upgrades for getting realistic cost and savings estimates.
3. Ability to bundle fast and slow paying measures together as a "package" by taking a systems approach, which is normally not allowed by the in-house team on their own.
4. Ability to bring third-party financing for project implementation, which could allow quick approval by eliminating the need for in-house capital allocation.
5. Use of carbon emission or NO_x reduction credits to bring additional financing (by "monetizing" those benefits to cash values).
6. Provide performance guarantees backed by financial commitments.
7. A keen focus on swiftly completing measures for the mutual benefit of the owner and the ESCO (the ESCO generally earns profits by successfully implementing ECMs, not merely studying their potential).

The "opportunity cost," or "cost of inaction," is often overlooked at first by the owner. Two years of no implementation of work waiting for budget and work sequence approvals can be a real "loss" compared to implementing a project swiftly and possibly solving various operational problems or necessary replacement work which otherwise might have had to be allocated from precious production or organization upgrade funds. The ESCO's keen focus on implementation is in itself an impetus to actually achieving energy cost reduction. For even the most ambitious EM still gets a paycheck every few weeks regardless of short-term action or results (although lack of long-term results can clearly

impact his/her future with the firm). For the ESCO, "no workee, no payee."

BUILDING A PARTNERSHIP

A number of issues are important for the EM employing an ESCO, which in general are useful for any organization to consider:

- *Identification of Project and Partners:* Both parties should be confident about the potential of the project scope as well as each other's abilities to execute the project. The ESCO selected should have expertise and experience that reflects a depth and breadth of activities that indicate the ESCO can handle any of the practical issues which would arise during the course of the energy upgrade plan[3]. The ESCO's track record and credibility should be evaluated, including:
  - — Is the ESCO accredited by agencies, such as NAESCO in the US?
  - — Does the ESCO have experience in executing an energy services agreement (ESA) at a corporate level while managing individual projects that are site specific?
  - — Does the ESCO provide ongoing maintenance and remote, 24/7 monitoring of project performance for multiple sites?
  - — Does the ESCO offer both supply and demand-side energy services? Does the ESCO offer environmental expertise?
  - — What sort of financing structures does the ESCO offer, and how does that fit within the corporate finance issues?
  - — Can the ESCO dedicate experts as required during the complete analysis phase or only for review?
  - — What are the credentials of the individual team members? How do they complement each other to provide a complete solution to the customer? Have these individuals implemented projects previously (even if the firm has, they may not have)?

- *Project Implementation Plan:* The EM needs to evaluate carefully the manner in which the project development efforts would be undertaken. Some ESCOs begin with a walk-through and quickly work toward detailed measurements for planning the upgrade, without

consideration of all of the ergonomic issues, history, problems with maintenance work, etc. This could have a substantial impact on the long-term success of a project; this short-sightedness is likely a detriment to the EM and owner organization. A contract that spells out the responsibilities of the owner to perform tasks they have never done and likely would have trouble performing may keep the ESCO out of financial trouble if savings fail to materialize, but do little good for the long-term project success. The idea is to build a relationship leading to a win-win situation. The legal aspects of the contracts should be developed to ensure that if either of the parties fails to fulfill their due obligations, the contract is not breached. Care should also be taken that secret "catches" are not slipped into a contract, potentially hurting the owner. The authors have seen this before in reviewing some ESCO contracts, and found it appalling, as well as stupid since it fundamentally violates the idea of a partnership. Telling the truth up front during contract negotiations can help the situation if there is to be a truly win-win relationship, especially when preparing a contract. Bad news does not get better with age.

- *Conducting Preliminary Audit:* The preliminary audit is a phase that can lay the foundation for a mutually beneficial partnership. It is important for the ESCO to work with the EM to obtain background data about the facility and understand reasons for past decisions. The ESCO needs to work with the EM to cost efficiently obtain necessary energy data as well as technical and maintenance data. The ESCO can then review the data and identify missing or additional data requirements. After this, an ESCO should work with the EM in obtaining the new data, and provide the necessary instrumentation if required. It is NOT wise to blindly accept spreadsheet summaries of past utility data, since the authors have seen time after time the best efforts of owners being entirely inaccurate, or some mixture of inaccuracies, errors, and misunderstandings. This could lead rapidly to very incorrect preliminary assessments.

- *Initiating the Project:* Before initiating the actual project, it is essential to verify that the ESCO can provide techno-commercial assurances by providing details of past projects for similar clients and also providing details of the various arrangements possible for

executing a performance contract. They should be flexible in order to fit the needs of the owner, not the other way around. The ESCO also has to work with the EM and corporate financial personnel to develop the most appropriate financing model and structure for the performance contract. It should be remembered by both parties that the ESCO arrangement is a win-win approach where both parties can gain maximum value if the arrangement is fair to both parties; the owner above all needs to understand this, and typically this is the biggest hurdle to overcome, since they are used to the idea of creating contracts that are virtually threatening to the ESCO, and not merely equal requirements.

- *Conducting Investment Grade Audit:* The investment grade audit (IGA) is carried out to identify the potential ECMs that can meet the project criteria set up in the contract. The manner in which the ESCO works with the EM to recommend possible ECMs determines to a certain extent the success of identifying most profitable measures. The EM should be able to interact with potential vendors to obtain necessary quotes for upgrades. The EM may not have time, but the willingness of the ESCO to be a true partner and share data could be an important element in selection of measures and fast approval. The ESCO needs to interact with the O&M staff to ensure its involvement and that its concerns are properly addressed. The findings from an IGA should be available to the EM during the course of the study effort, so that he/she can verify findings on behalf of owner. This is essential for trust and confidence in executing results from the detailed study phase. The idea of the ESCO performing its work in a vacuum does not help the owner implementation approval process at all.

- *Approach of the ESCO to Project Commissioning:* Does the ESCO have a process that verifies that new equipment and systems will operate as designed, based upon a priori determined performance criteria? Commissioning should begin during the project design phase and last at least for some extended period following construction completion. Training facility operators and staff is a key component of successful project commissioning. One possible ECM is the process of commissioning itself, or at least a portion of that in terms of air and water balance appropriate to the current

operation for a building facility. Although the cost is not great, the return can be very high on the investment, and can be viewed as part of the package of ECMs which, taken together, can improve both the energy cost reduction and the facility comfort.

- *M&V processes:* Although the primary motivation of utilizing an ESCO is often energy cost savings, other important conditions may include on-time completion, improved productivity, operational effectiveness, or enhanced energy efficiency without impacting capital costs. The savings measurement and verification (M&V) process documents and confirms that the resultant project is providing the projected level of savings, or at least identifies where the deficiencies lie. Appropriate M&V methods are contingent upon the technical configuration of the project and can include one-time or periodic end use measurements, engineering calculations, submetering, utility bill analysis, computer simulation, and other methods. A solid but simple M&V strategy is a key element of any project. The International Performance Measurement & Verification Protocol (IPMVP) is a good reference for deciding the proper M&V guidelines. An important element to consider, however, is just how complicated does the ECM M&V protocol need to be, given that the EM or his people are likely to be the group responsible for tracking the resultant savings calculations from the ESCO. Therefore the EM will need to technically evaluate the data available; if they are complicated, then the EM team has to spend additional time, unscheduled and unbudgeted, to determine the validity of the savings, which then partially defeats the purpose. In spite of all the sophisticated M&V methods which can be developed, the final M&V acceptable to the owner may very well need to be some very simple method to track the project measures so that the owner does not have to hire someone to decipher all the technical details provided by the ESCO.

- *Maintenance:* Additional services offered by the ESCO, such as maintenance, can be an issue with some ECMs. Whether the ESCO itself, or through a network, takes care of the situation should not be important as long as the topic is addressed in an effective and satisfactory manner. After all, some ESCOs are actually equipment vendors who offer ESCO services to sell their equipment and

maintenance services, so having such services in-house and locally is not necessarily important, since some of those firms may actually gouge on pricing. Ensure that the owner is comfortable with a long-term relationship, typically 7-10 years. One possible drawback is the loss of flexibility associated with signing a contract with a single contractor for a lengthy time period—this is an obvious corollary of the benefits of using a single source contractor for the entire project.

It is especially important that the owner realize that if a business partnership type arrangement is to occur, then it is NOT to the benefit of the owner to try and limit the income potential of the ESCO, as long as it is structured contractually so that only if the owner benefits greatly can the ESCO also benefit. In this way, instead of the owner seeing the ESCO as an "expense," the ESCO truly becomes the "value added" service, namely, to be an entity which creates value for the owner where there had previously been none, creats new cash flow potential for the owner, and then assists the owner to utilize those funds for the best advantage of the owner. When successfully applied, both parties have risks and rewards, and both can benefit from the success of a project, as would be expected if one had a form of partnership, which is supposed to be a collaboration.

ESCO SELECTION CRITERION

Developing a general set of selection criteria can be useful for the owners in selecting a qualified ESCO.

1. Involve the in-house EM in negotiating contracts and the technical scope of the project.
2. Select an ESCO with a good track record that can provide all the required necessary services, such as project design, installation and maintenance, instead of merely seeking the lowest bidder. Obtain references and verify them.
3. The owner should be comfortable with the proposed ESCO team, as opposed to just the size of the firm.
4. Negotiate a contract that reasonably limits ESCO profit-making and establishes a win-win arrangement of the ESCO with the owner.

5. Carefully weigh the pros and cons of shared savings versus fees for services and other contractual arrangements.
6. Make sure the agreement does not allow the ESCO to sacrifice quality for energy savings and ensure that the owner receives the performance guarantees.

PROJECT IMPLEMENTATION CRITERION

1. Require the ESCO to take a "comprehensive approach" to energy conservation by combining measures with a rapid payback with those with a longer payback time, rather than a "cream-skimming approach."
2. Develop simple but comprehensive M&V guidelines for the project using IPMVP—that will form the basis for analyzing performance and savings.
3. Work with the ESCO to incorporate extended product warranties and personnel training into the project bid specifications.
4. Once a contract is signed with the ESCO, organize an in-house project team to work with the ESCO to choose appropriate energy measures, prepare bid specs, pre-qualify prospective bidders, etc.
5. Design the project and coordinate construction in a way that minimizes disruption to the day-to-day facility operation.
6. Document both energy and non-energy benefits of your project and publicize its success within as well as outside the organization. If possible use the project for getting or improving visibility through EnergyStar or LEED certification.

CASE STUDY

The authors had the unique distinction of representing both the ESCO side and the owner side in a recent ESCO energy project implemented in India in a high-tech set of industrial/commercial facilities. The approach, contract terms, and implementation plan followed the above outlined "partnership" approach, and as a result both parties felt the results were "a winner." The project scope covered three buildings of Tata Infotech Ltd. at two of their main office sites, one in Mumbai and the other in Delhi. The corporate EM and staff had already implemented

a substantial number of "O&M" type measures to reduce energy costs at little or no cost. These locations were software development centers, involving highly trained IT professionals, and thus productivity concerns associated with the work environment were given special attention. The three buildings together had the capacity for 700-1000 IT professionals working on diverse projects in an area of about 75,000 sq. ft. The electrical energy was used for lighting, comfort air-conditioning, substantial computers and office equipment, water coolers, etc. The lighting and HVAC cooling, however, accounted for the majority of the energy consumption. Electric rates were 8-10 cents/kWh, which was very high for Indian incomes.

Previous success of the O&M measures in reducing energy bills aided in securing management "buy-in" for proceeding with big ticket ECMs through the ESCO route. An ESCO partner was sought to help in improving the reliability of the facilities as well as evaluating costs and benefits of various upgrades, both for infrastructure upgrade needs and energy efficiency, since the in-house EM team realized they had only limited technical skills for larger scale projects. As a prelude to selecting an ESCO, a set of written selection criteria were prepared and used in the decision process for identifying a suitable ESCO. From this criteria, TEPS (Thermax/EPS) was selected. This firm had been implementing energy cost savings measures in India for some time; TEPS was a joint venture firm of EPS located in India, with local Indian technical and construction talent to support the efforts. To supplement the local TEPS technical team, the American author from EPS in the US spent time with TEPS and Tata Infotech identifying and analyzing potential practical energy savings measures, and guiding the process on behalf of the ESCO.

Each site was specifically commissioned for the purpose of supporting software development and offshore IT project efforts with software professionals, meaning substantial computer graphic display screens and a high density of people and electronic heat generating equipment present. Both sites included office areas which were either renovated or expanded to meet the increased project demands during the Y2K project boom in late 90s. Although the owners had spent considerable sums for design professionals and contractors to develop work areas which were conducive to such high-tech, long working hours of operation, the results left room for much improvement, especially in terms of optimizing energy consumption. A payback criterion was estab-

lished, and performance guarantees agreed to by the ESCO, and ground rules concerning good lighting and environmental qualities for worker comfort laid out. Using these guidelines as the driver, a series of practical opportunities were identified, with open discussions and input from the owner side to insure future buy-in of the implementation plan coming out of the ultimate IGA which would be developed.

The Mumbai site had a unique problem in that for the original design work done a few years before, a lighting vendor had assisted the local architect in "designing" all lighting in a recently expanded area, and it clearly appeared in retrospect that the sole criterion used by this vendor was to maximize the sales commission on fixtures. The facility was grossly overlit, and CRT glare not considered at all—this in a facility which was originally designed to house hundreds of IT professionals who would use computers every day! The results of the original lighting design were untenable, not only from visual acuity, but also from utility costs. Later, the owner and the EM team attempted a temporary solution by delamping approximately 50 percent, but no provisions had been made for end-user task lighting, and with the facility being operational 16 hrs a day, 6 days a week, all efforts had been focused on "damage control," as opposed to major design changes [4]. Also, as part of this older renovation, the owner had chosen to leave all existing split DX HVAC equipment in place (with one area served by a chiller), which resulted in poor air distribution and variable space temperature control. One advantage when the ESCO project began was that the in-house energy management team identified some major upgrade opportunities and decided to implement them through the ESCO route, instead of trying to skim all the cream through in-house efforts, and then not have any economic justification remaining to correct other deficiencies [5].

The Delhi site had one floor of the building completely retrofit and unoccupied, and yet the ESCO audit team identified that the new lighting systems, just completed, were wholly inadequate for occupant needs due to far too little lighting, although it had been designed to have an architectural ceiling with an unusual ambiance. The "energy efficient" lighting was a series of very small, exposed PL lamps, which taken together could never provide sufficient base building lighting sufficient even for IT functions, and no task lighting at work spaces had been considered. The remainder of the lighting at this site was essentially a series of 2×4 two-lamp industrial grade fixtures with louvers to reduce glare (not a fully engineered deep parabolic product available now for

areas with many CRTs). The old split DX HVAC had been left in place to allow the architect to use more funds for wall finishes. As a result, the HVAC was not well configured for the new space, with "dead spots" and poor air distribution in the redesigned space, so lower cooling set point temperatures were required to compensate for overall average temperature comfort in the space. There had been continuing maintenance problems at both sites with the older HVAC, so not only were there comfort problems, but one paid for the privilege.

As a result of the investigation of the older existing HVAC controls, it was determined by TEPS that a major replacement of most of the HVAC systems at both sites was in order, and a reconfiguration of the air distribution systems and zoning needed, along with conversion to central chilled water systems, especially since the operating hours typically were fairly set on a daily basis, approximately 5-1/2 days per week. Implementing these changes would greatly reduce maintenance problems and energy consumption, and simultaneously improve worker space temperature comfort. Working with the ESCO in a partnership mode allowed the process to initiate almost seamlessly, and minimized the amount of start-up effort required by the ESCO team later [6]. The business structure between TEPS and Tata Infotech was configured as a partnership, with open book information available at all times so the owner was reassured that he was not being shortchanged on quality or overcharged. Part of the effort was educating owner personnel as to the requirements and potentials of going to different equipment and systems, but at the price of more sophistication and therefore need for personnel training [7]. No water savings measures were found to be cost effective. The owners were sensitive to environmental issues such as reduced CO_2 emissions because of the Kyoto Protocol and a general sense that energy efficiency is good for the employees and business.

At one site, the following overall conditions resulted from the ESCO project:

- Approximately 35 percent reduction in electric energy charges, due to lighting, A/C, and air side modifications.
- Reduction in the contract demand, a minimum charge set by the local utility, thereby reducing the minimum charges to the power company; this was due to the substantial kW reduction in equipment loading to achieve the same results.

- Provision of new task lighting for individual professionals to control, so as to improve the net lux levels at workstations yet avoid glare.
- Improvement in comfort air-conditioning, in terms of the uniformity of temperatures in different areas.

At the other site, the results were:

- Almost a 25 percent reduction in overall electrical costs.
- Reduction in annual maintenance contract charges.
- Installation of new electric screw chillers with low specific power consumption (0.65 kW/ton) relative to the old DX at about 1.2 KW/ton.
- 100 percent A/C equipment stand-by availability provided.
- Improved occupant room temperature control possible with modulating control valves provided with all AHUs.
- Improvement in employee efficiency due to substantially improved building and space lighting; the IT professionals now had some control over their individual lighting to fit task lighting requirements, which can vary depending on whether direct computer work was involved or office report writing/review was involved.
- Reduction of glare on the computer screens for part of facility through use of special diffusers for tubelight fittings.
- Substantial greenhouse gas emissions reductions occurred as a result of the project implementation.

Taken together (on a full cost recovery basis) the projects had a simple bundled payout of less than four years. Because of the performance guarantee provided by the ESCO and the availability of in-house capital with the positive cash flow projections of the IGA, the owner opted to finance the project using internal funds instead of third-party financing through the ESCO as originally agreed to. Special tax and program incentives provided by the Indian government for energy efficiency improvements helped improve the financial feasibility [8].

Part of the basis of the success was the open dialog and team configuration structured into the ESCO project. Both parties had the opportunity to provide input and review interim work as a team, as opposed to "them" and "us" which can be prevalent in some typical design and bid projects. The ESCO included the EM and/or his key team members

in meetings with selected vendors concerning equipment newer to India, so that the pros and cons could be weighed mutually. The ESCO led the efforts, not depending upon the EM and his staff, but able to utilize such resources to speed up the data gathering and approval processes [9]. The EM understood that use of an ESCO does not suggested lack of skills or focus on the part of the company EM team, but instead allowed acquisition of those professional engineering and implementation talents through a single source, the ESCO [10].

Could the same results have been achieved solely through the standard (a) secure design engineer, (b) bid work, (c) contractor engagement process? Possibly, but it would have definitely left many of the "intangible" benefits of the interaction on the table, since each activity otherwise would have been independent, involving separate companies, with no single vested interest in the outcome, and a much longer elapsed time to implementation completion. The results of the work were successful, despite severe constraints, because the ESCO and the EM team worked together. The owner needed changes for the benefit of worker productivity if nothing else, and the resolution of all of the problems in a cost-effective and timely manner required in-house and outside expertise working together. This is exactly what an ESCO can do if the contract is properly structured and neither party is concerned about who gets the credit for a successful project.

CONCLUSION

Ideally the energy management projects can be a good example of a win-win partnership as both the EM and ESCO are working towards achieving the same objectives, but there are potential pitfalls that should be avoided. The EM and the ESCO must both be committed to the project's goals and cooperate with each other to achieve their mutual goals. This means that the owner's EM and his people must be responsive to the ESCO so that the project can move expeditiously; failure to respond by the owner's side should be a tacit approval of work, as opposed to the other way around, for otherwise the work tends to drag out interminably. Effective communication and a clear understanding of both parties' roles and responsibilities are critical to successful project performance. Without them, the partnership may deteriorate and project performance could be seriously compromised. Therefore, the most suc-

cessful projects are those where the ESCO builds on the inside strengths the EM can bring, and the free market and the elimination of red tape allow the ESCO to move rapidly within the legal allowances of the owner, who after all is the ultimate client in the process.

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ABOUT THE AUTHORS

Bruce K. Colburn, Ph.D., P.E., CEM, has 33 years of engineering experience. He developed his own engineering consulting firm in College Station, TX, and then combined that work in Houston, TX, with

Texas Energy Engineers/ccrd partners. He was CEO for 10 years. He has served numerous clients over the years in planning, designing, analyzing, troubleshooting, and retrofitting industrial, commercial, healthcare, and power projects throughout North America and the world.

He is executive vice president and COO for an international ESCO company, where he is responsible for the development and successful performance of projects in 12 countries. In this position, his work includes control over the major technical and financial activities on all projects, including feasibility analyses, investment grade audits, savings calculation methodology, economic evaluation, project costing, engineering design, specifications of equipment, application of best technologies, personnel selection and training, and on-going international monitoring and verification of savings.

Prior to entering the consulting field, Dr. Colburn was an associate professor of electrical engineering at Texas A&M University, and also spent a period at Baylor University as an adjunct professor of engineering. He is a widely published author with over 50 publications to his record. He is a charter member and life member of AEE, member of IEEE, ASHRAE and AISE and is associate editor, reviewer, awards committee member, director, and advisor for numerous technical journals and engineering organizations.

Rahul Walawalkar, M.S., CEM, holds a Master's in energy management & advanced certification in energy technology from New York Institute of Technology. He has more than six years working experience in various roles from software developer, product manager, program manager, to being coordinator for company's initiatives in area of energy management and ergonomics.

He is the recipient of 'Demonstration of Energy Efficiency Development—DEED' Scholarship from American Public Power Association, the Dr. Homi Bhabha Young Scientist Award (1990), and Golden Web Award by International Association of Webmasters & Designer for three years. He was in charge of a company's energy management initiatives, which have resulted in more than 30 percent savings for Tata Infotech. Rahul developed energy efficient lighting design software, Eco Lumen, and as a result, received the Computer Society of India's Young IT Professional Award in 2000 for developing Eco Lumen.

He has written over 30 papers and was editor of 'Energy Productivity News,' the newsletter of Council of Energy Efficiency Companies in India and Alliance to Save Energy. He is a member of IEEE, AEE, ESMS, IESNA and IAEE.