

Energy Efficiency Decision-Making in the Corporate Sector

-Issue Paper Four-

**Energy Efficiency Working Group
Energy Sector Sustainability Table**

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Preface

The Energy Sector Sustainability Table (ESST) was established in 2005 as a multi-stakeholder advisory mechanism - including senior representatives from governments, industry, and civil society – created by the Government of Canada to provide advice on how best to meet the energy needs of Canadians so as to improve the environmental and economic sustainability of energy systems in Canada and to make recommendations on short-and long-term sustainable energy objectives.

Energy efficiency was identified as key priority for the ESST so the Table established the Energy Efficiency Working Group (EEWG). The EEWG is a committee of industry, government and civil society experts mandated to provide the ESST with an expert perspective on energy efficiency in Canada. The EEWG has produced several products including its Energy Efficiency in Canada Foundation Paper, a series of issue papers, and a final report summarizing the key conclusions and recommendations that resulted from the EEWG's work.

This issue paper is one in a series of a total of eight issue papers. The paper, as well as all other EEWG products, was prepared by the EEWG in conjunction with Marbek Resource Consultants and Dr. Michael Margolick.

To access other EEWG documents or for more information about the Energy Sector Sustainability Table and its Energy Efficiency Working Group, please visit: <http://www.sst.gc.ca>

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1. INTRODUCTION

Conventional financial models are considered more applicable to energy-related decisions by commercial interests such as manufacturers, property owners, service providers and retailers, than those of individuals. However many decision factors important to commercial interests are not part of those models. In practice, non-energy considerations are often more important and there are numerous barriers that prevent optimum decision-making with respect to energy efficiency.

This paper looks at the context for energy management decisions including the criteria, constraints and drivers for these decisions, and the barriers that prevent optimal investment in energy management in the corporate sector. For the purposes of this paper, the corporate sector includes industry and commerce. Because they are quite distinct and involve very different considerations, commerce and industry are, for the most part, examined separately.

The paper is organized as follows:

- Section 2 examines energy use in the corporate sector
- Section 3 defines energy management and discusses the value proposition for energy management, looking at both the energy and non-energy benefits
- Section 4 examines evidence to illustrate that energy management investments remain sub-optimal.
- Section 5 examines key barriers that impede corporate energy management investments
- Section 6 suggests a few key messages.

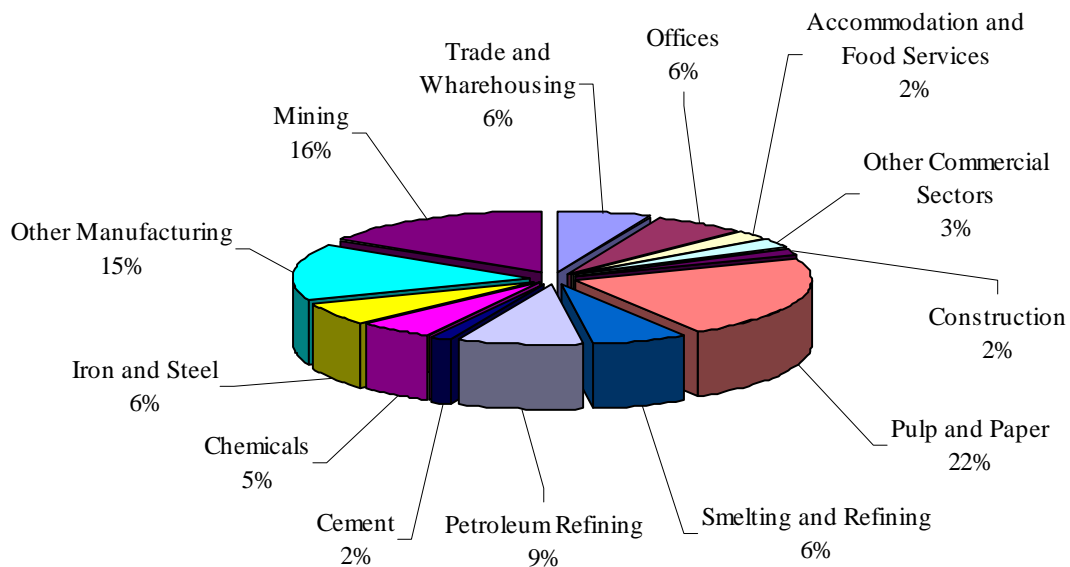
2. BACKGROUND

2.1 ENERGY USE IN THE CORPORATE SECTOR

The corporate sector (excluding transportation) represents almost one half of secondary energy consumption in Canada.¹ Furthermore, Canada's Energy Outlook projects an absolute increase in energy demand in the corporate sector of 1000 Petajoules (PJ) by 2020, about a 25% increase relative to 2005.²

In 2004, total energy use was approximately 4,000 PJ. The breakdown is shown in Figure 1.

Figure 1
Breakdown of 2004 Secondary Energy Demand in the Corporate Sector



Source: *Energy Efficiency Trends, 1990-2004*

¹ Natural Resources Canada, *Energy Efficiency Trends in Canada, 1990 – 2004* (August 2006). This includes the entire industrial sector, and most of the commercial sector (with the exception of health, education and public administration).

² Natural Resources Canada, *Canada's Energy Outlook: The Reference Case 2006*. This assumes no new policy initiatives.

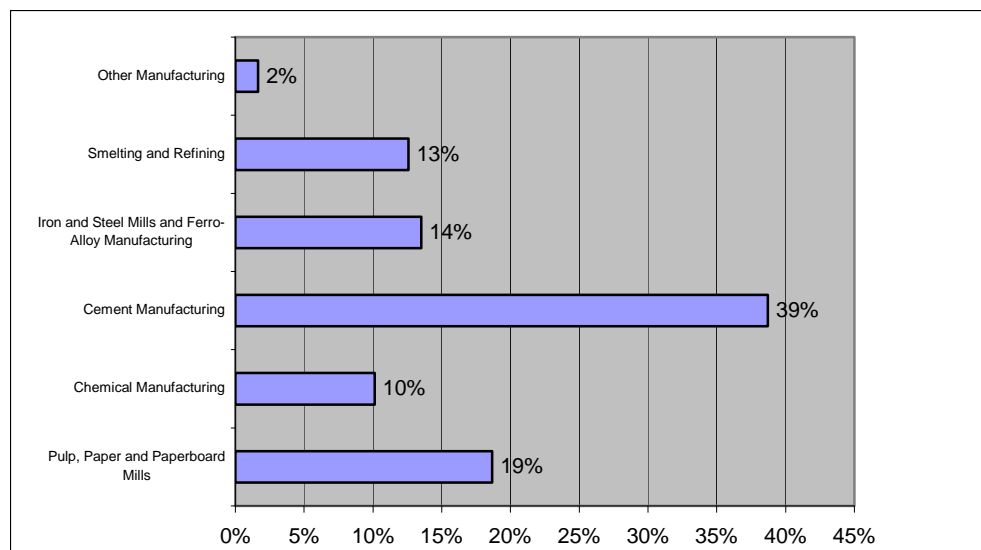
2.2 ENERGY COSTS IN THE CORPORATE SECTOR

Energy costs can represent a significant component of corporate sector operating costs.

Industry

In 2004, the total energy and water bill to Canadian manufacturing amounted to about \$16 billion. In terms of energy costs, electricity and natural gas account for a combined 83% of costs. For manufacturing as a whole, energy represented approximately 4% of operating costs. As Exhibit 2 indicates, the industry operating cost profile varies considerably across sub-sectors from 2% in “other” manufacturing to 39% in cement manufacturing. The average in the energy intensive industries was 9%.³ Exhibits 3 and 4 show energy costs as a percentage of three different financial indicators for a variety of industries. As noted, energy costs are particularly significant in industries such as paper, printing, petroleum products, minerals and metals. In manufacturing as a whole, energy costs average 5% of costs and 14% of profits.

Exhibit 2
Industry Energy Operating Cost Profile in 2004



Source: Annual Survey of Manufacturing and Logging

³ Statistics Canada, *Annual Survey of Manufactures and Logging*, April 2006.

Exhibit 3
Energy Costs as a Percentage of Business Indicators⁴

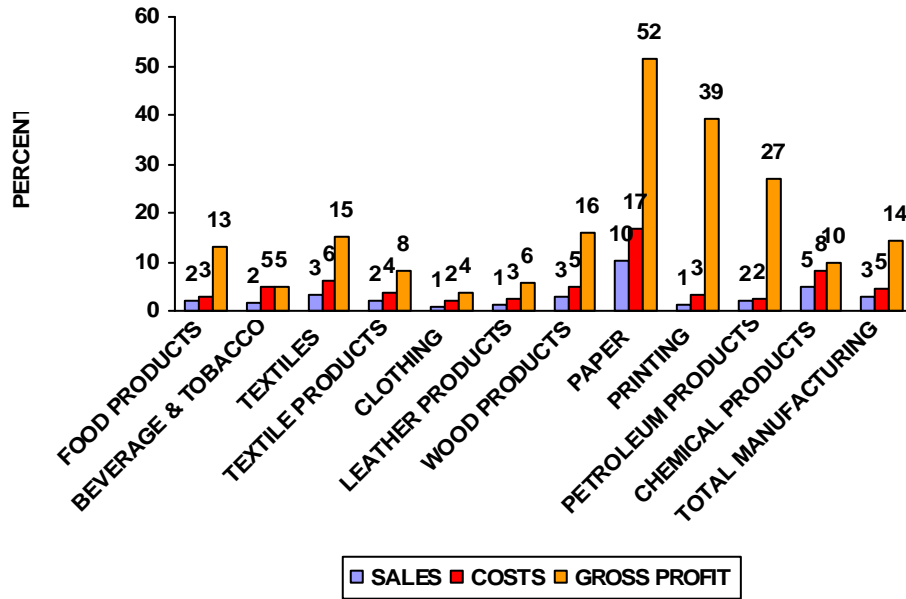
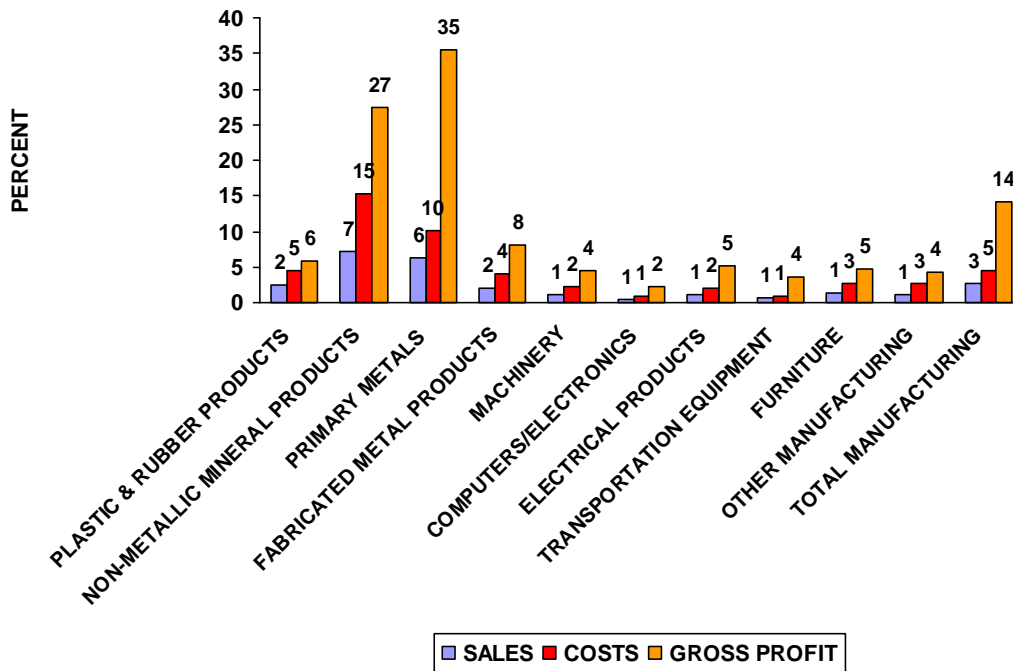


Exhibit 4
Energy Costs as a Percentage of Business Indicators⁵



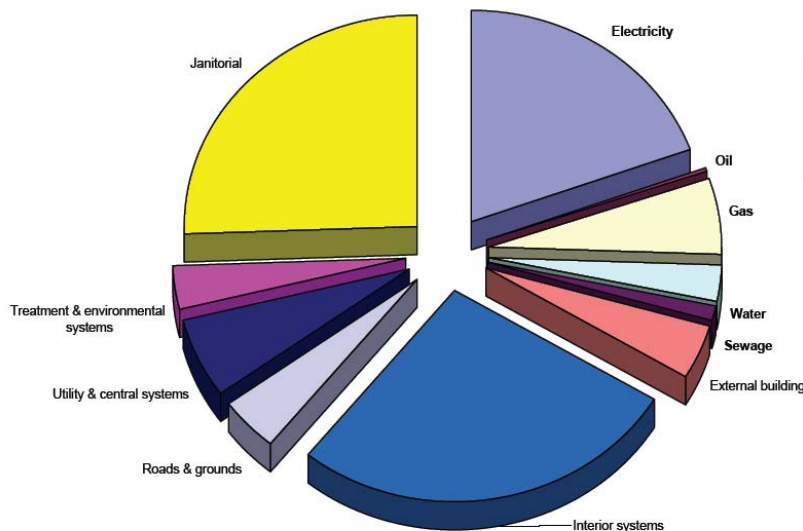
⁴ Jayson Myers, Senior Vice-President & Chief Economist, CME, *Strategic Issues for Canadian Manufacturers*, April 1st, 2005

⁵ Ibid.

Commerce

For most commercial operations, the key costs are associated with the operation of buildings. Exhibit 5 shows that in a “typical” office building, energy can represent about 30% of total operating costs. As most of these buildings are leased, the costs are initially incurred by landlords and are usually passed on to tenants. From the perspective of most commercial tenants, building operating costs are only a portion of total accommodation cost (the other principal components being net rent and property taxes) and accommodation costs are only a small proportion of overall operating costs, which tend to be concentrated on salaries. Thus energy will typically represent only 1-3% of total operating costs.

Exhibit 5
Commercial Office Operating Costs⁶



⁶ Chris Corps, Asset Strategics and Doug Webber, Halsell Engineering, *Canadian Perspective-Green Progress in Canada*, a presentation to the Advancing Green Buildings meeting in LBL for the Commission for Environmental Cooperation, October 2006.

3. CONTEXT FOR ENERGY MANAGEMENT

3.1 WHAT IS ENERGY MANAGEMENT?

Energy management is the sum of measures planned and carried out to achieve the objective of using the minimum possible energy while maintaining comfort and functionality (in buildings) and the production rates (in industry).⁷

There are six elements that are part of a typical energy management system: corporate commitment, planning, organization, project financing, measurement & reporting and communication.

Actions are focused on:

- Energy conservation
- Energy efficiency
- Demand management
- Energy recovery
- Energy substitution

In general, energy management consists of two types of actions: (1) adoption of technical and management best practices and (2) investments in new, more efficient equipment and systems.⁸ Each of these dimensions is briefly discussed below.

Best Practices

Technical practices are the equipment, systems and operating methods employed in the operation. Technical best practices mean that the overall energy efficiency is optimized. To move from a lower state of technical practice to the best or highest state may require investment in equipment and systems, or training in improved operating methods, etc. The penetration of technical best practices can be assessed for all major energy end-uses in corporate operations as well as on an overall system basis within plants and buildings.

Management best practices include steps to collect and utilize energy information, improve understanding and awareness of energy efficiency, provide training (e.g. operator training), integrate energy management into the overall business strategy, and provide leadership. Management best practices enable the company to attain higher levels of technical practice.

⁷ Adapted from energyoffice.org.

⁸ Investments may be O&M or capital. Capital investments are usually investments that become part of the asset ledger of the balance sheet and are amortized. Smaller equipment improvements can be done on a maintenance budget and are not capitalized. Rebuilds of existing equipment can be capitalized if they clearly extend the life of the equipment or significantly enhance its performance. The tax situation of the company could influence the decision on how the investment is treated although the accounting rules limit this discretion.

Good management provides a good investment process by providing the organizational capability, information, communication, planning, financing etc. Investment is one of the steps to attaining higher levels of technical practice. Another step is training to operate the equipment as efficiently as possible. In other words, management enables good investments to be made to reach higher levels of technical practice.

Investments in Equipment and Systems

The level of investment in energy efficient equipment and systems is a major factor in a company's ability to implement technical best practices. At the same time, this level is determined in large part by the extent to which energy management best practices are adopted.

Investments may include new equipment or equipment upgrades and retrofits. In the case of capital investments, these can occur at the time of normal equipment replacement or on an accelerated replacement basis. When investments occur on the cycle of normal equipment replacement, their cost is the difference between the standard and high efficiency equipment investments, referred to as the “incremental cost”. When investments occur prior to the end of equipment useful life, i.e., on an accelerated replacement basis, the full cost of the equipment or retrofit is used.

3.2 HOW ENERGY MANAGEMENT DECISIONS ARE MADE

Corporate decision-making typically relies on the presentation of a business case for departures from the status quo. Thus, energy management decisions are driven by the need to demonstrate a benefits stream to offset the costs. The expectation is that the adoption of best practices and capital investments will pay-off with an ongoing stream of benefits. In some instances, the benefits have been viewed in the narrow terms of energy cost savings. Recently, however, more companies have begun to appreciate that there may also be non-energy benefits.

Energy Savings

The energy savings from adoption of best technical practices and capital investments have been well documented.⁹

Typically, an energy management project must compete within the internal capital budgeting process to get financed and implemented. This usually requires that the investment must, at a minimum, meet the hurdle rate of the company. In simple payback terms, these hurdle rates are generally very short, in the range of 1 to 3 years for industrial and commercial operations.¹⁰

⁹ See for example, the annual CIPEC reports. It is worth noting, however, that some *so-called* production best practices may actually lead to increased energy use.

¹⁰ EPS and Marbek Resource Consultants, *Dollars to Sense Financing Workshop Needs Assessment*, 2005. These hurdle rates apply to investments that have a relatively long lifespan. Equipment that have short or uncertain lifespans would necessarily have shorter payback hurdle rates.

Non-Energy Benefits

Exhibit 6 presents a typology of potential non-energy benefits associated with energy management investments in both industry and commerce. In the case of industry, the benefits hinge on the ability to promote energy efficiency investments as contributing to improved productivity. For the commercial sector, the key is to raise the value of the buildings.

Many of the benefits are difficult to quantify (e.g. corporate image, staff morale). However, when the non-energy benefits stream can be quantified, their addition to the business case analysis can significantly improve the payback and increase the overall value of the investment. Estimates indicate that including the quantifiable non-energy benefits can increase the overall value of the investment by a minimum of 30% and possibly as high as four times the value of the energy benefits alone.¹¹

Exhibit 6 Typology of Non-Energy benefits from Energy Management Investments

Sector	Benefits That Further Reduce the Pay-Back Period of Projects at the Facility Level
Industry	<p><i>In industry, productivity improvements at plant level¹²</i></p> <ul style="list-style-type: none"> • Reduce <i>operation and maintenance</i> costs (e.g., reduced labour, reduced materials use) • Promote more efficient <i>production</i> (e.g., reduced resource consumption, higher output per unit of input, reduced run time) • Improve <i>health, safety and worker environment</i> conditions (e.g., reduced noise and dust) • Reduce air, water and solid waste releases thereby <i>avoiding environmental compliance costs</i> • Help meet overall environmental quality objectives at lower cost
Commerce	<p><i>In commerce, improvements in buildings¹³:</i></p> <ul style="list-style-type: none"> • Attract tenants faster • Result in higher rents, investment/sale value • Lower turnover/vacancy • Reduce fitting-out costs • Lower internal move costs • Increase productivity • Reduce risk • Improve marketability

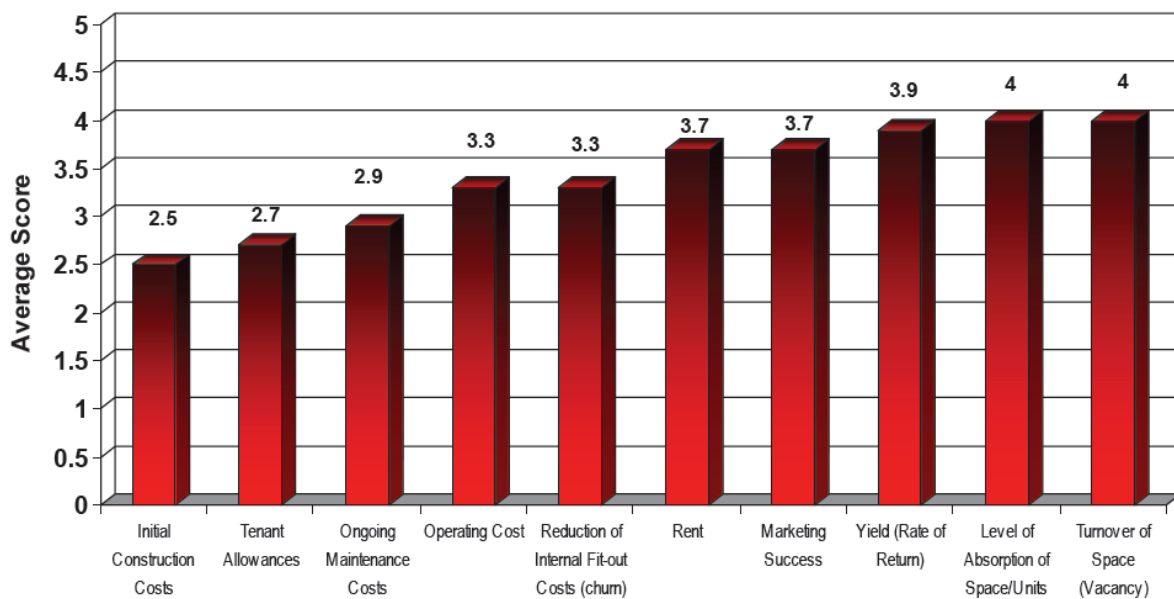
¹¹ Marbek Resource Consultants, *Framework for Quantifying Non-Energy Benefits of Industrial Energy Efficiency Projects*, for the Office of Energy Efficiency, May 2006, p.5.

¹² Ibid.

¹³ Chris Corps, Asset Strategics and Doug Webber, Halsell Engineering, *Canadian Perspective-Green Progress in Canada*, a presentation to the Advancing Green Buildings meeting in LBL for the Commission for Environmental Cooperation, October 2006.

Exhibit 7 provides an indication of the range of costs and benefits that might be included in a business case for a commercial building owner or manager to invest in green building features. Note that respondents were asked to rate the extent to which those costs or benefits fell below, met, or exceeded expectations. Most respondents noted that construction costs failed to meet expectation (i.e. were higher than expected) but savings in operating costs typically exceeded expectations. Most interesting was the extent to which other factors, such as ability to charge higher rents and avoiding vacancy, exceeded expectations.

Exhibit 7
Extent to Which Green Building Investments Met Expectations
(1 = not met, 2 = partially met, 3 = met, 4 = partially exceeded, 5 = exceeded)



3.3 THE KEY PLAYERS IN THE DECISION-MAKING PROCESS

The people involved in energy decision-making will vary depending on the nature and size of the business and the size of the investment. Some of the potential players are described below.

Industry

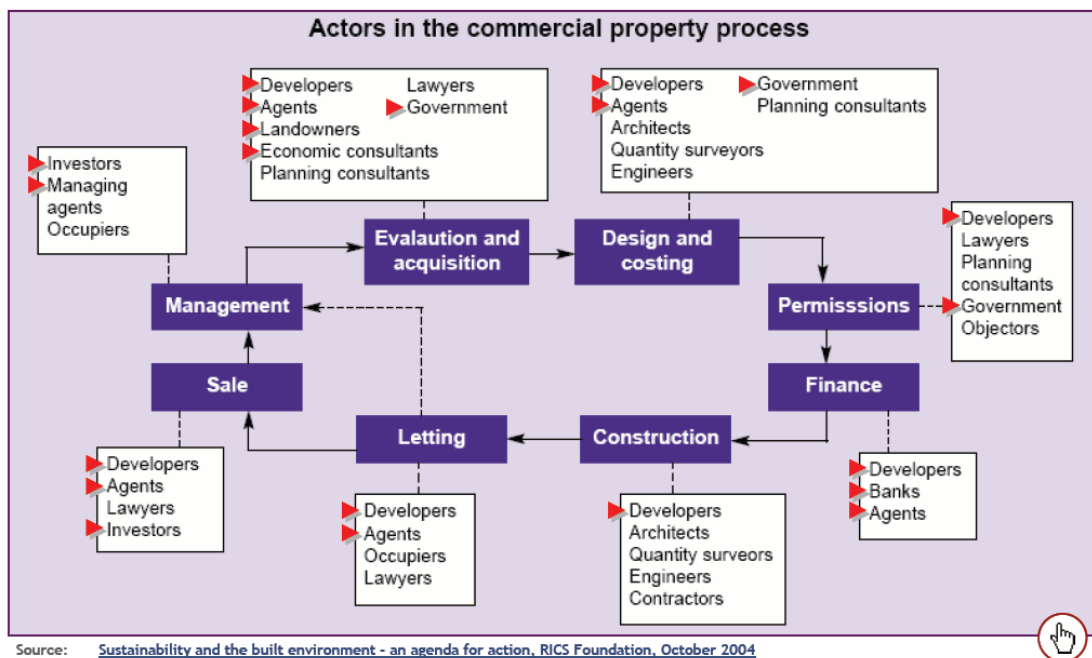
The Chief Executive Officer (CEO) is mandated to increase shareholder wealth. To champion energy management, a CEO must navigate among various forces. The CEO responds to a Board of Directors where certain business values as well as targets for performance are imposed. Notwithstanding the important role played by the CEO, the day-to-day and year-to-year corporate decision-making involves input from several key responsibility centres where the business case for energy management investments will be influenced by a team of individuals. The management team organization will depend on the size of the company and the nature of the industry sector. The key players could include:

- **Chief Financial Officer (CFO):** mandated to provide financial oversight and ensure that ROI target is realized.
- **Chief Engineer:** mandated to provide in-house engineering expertise to the corporation. May hire outside engineering services. Can provide engineering and performance standards for the operations in the corporation. In small companies, the chief engineer may be merely a plant engineer.
- **Operations or Manufacturing Executive:** responsible for all aspects of manufacturing operations. Usually a key player in the allocation of capital for sustaining operations.
- **Plant Manager:** mandated to meet production key performance targets and, in this regard, must consider monitoring, maintenance, and utilization of energy flow data.
- **Procurement Director:** mandated to ensure reliable, least cost supply of energy. Optimized and well-maintained plant systems are less prone to breakdown, which means fuel and other inputs can be more accurately projected and obtained through lower cost fixed-volume contracts.
- **Plant Floor Staff:** The increased emphasis on monitoring and maintenance requires a greater level of staff training and involvement.

Commercial Sector

The key players in the private commercial business sectors, mapped according to key roles in the industry, are illustrated in Exhibit 8.¹⁴ As shown, some players are important actors in multiple functions of the commercial property realm, in particular, the developers and agents.

Exhibit 8
Key Players in the Private Commercial Business Sectors



¹⁴ Chris Corps, Asset Strategics and Doug Webber, Halsell Engineering, *Canadian Perspective-Green Progress in Canada*, a presentation to the Advancing Green Buildings meeting in LBL for the Commission for Environmental Cooperation, October 2006.

4. CURRENT STATE OF INVESTMENT IN ENERGY MANAGEMENT

The Optimum Level of Investment

The optimum energy efficiency for a company would be attained if the company had sufficient resources to implement all the energy efficiency projects for which good business cases could be developed. No opportunity would be left unexplored. This assumes that all the investments would be accretive by providing returns that covered the cost of capital. Any further investments to increase energy efficiency would destroy value for the company as these investments would have returns below the cost of capital. All investments would have risk profiles commensurate with the required return on investment.

The optimum level of energy efficiency for a company can be altered by changes in the price of energy, the investment cost, or the risk profile of the investment opportunities. The arrival of new technologies can raise the optimum level of energy efficiency.

The difference between the actual level of energy efficiency and the optimum level for the current business environment (prices, costs, technology) is often called the energy efficiency gap. This gap and the barriers that lead to it are the focus of the rest of this Paper.

The value of this theoretical construct is that it allows us to differentiate the means and methods to reduce the gap from those means and methods to raise the optimum efficiency level. Reducing the efficiency gap increases the profitability of the company. Raising the optimum level of energy efficiency through higher energy prices, will increase the efficiency gap and create further inducement for the company to make the energy investments. However, if overused, it can reduce profitability to the point where the future of the company is in peril. Lowering risk, investment cost, or promoting the development and adoption of new technologies, on the other hand raise the optimum level of energy efficiency without reducing a company's profitability.

The Energy Efficiency Gap

Despite the financial pay-off and other benefits, the evidence indicates that corporate sector energy management investments continue to be sub-optimal – i.e. the full breadth and depth of investments that are economically justified are not being implemented. It continues to be the case that while many energy management opportunities can be shown to be cost-effective, when the monetary value of the energy savings are assessed against the initial capital cost outlays, the corporate sector appears to forego apparently cost-effective investments.

As noted in the Energy Efficiency Working Group (EEWG) Foundation Paper, Marbek and Jaccard's study for the Canadian Gas Association estimated the economic potential for

percentage savings from the reference case in the range of 13% for industry and 23% for the commercial sector.¹⁵ Yet the realization of this potential is not occurring.

Some of the apparent gap is the result of the application of different discount rates: as noted in Section 5.1 of this paper, corporations assess projects using a rate based on their cost of capital plus a risk premium. As a result, project discount rates can be much higher than social discount rates used by governments. As well, there are additional barriers for corporations that limit the full economic potential for savings from energy projects. These barriers are outlined in Section 5.1 of this paper.

Gap in Best Practices

Recent technical and management best practice studies illustrate the extent to which energy management investments remain sub-optimal. One study covered 28 of the largest industrial energy users in New Brunswick, representing 60% of total industrial energy use.¹⁶ For this group, the study estimated that economic and achievable energy savings of 13% from reference could be achieved using technical and management best practices.¹⁷ Exhibit 9 shows the results of a technical best practices assessment of New Brunswick in industry. The performance indicator shown on the Y axis is the average of the number of implemented technical best practices as a percentage of the total possible applicable technical best practices. The analysis was applied to all key industry end-uses and on an overall systems basis. As shown, overall 58% of technical best practices have been implemented, or put another way, there is a 42% technical best practices gap. Of course, at any moment, not all companies can implement all best practices. By definition, best practices are moving targets which are adopted over time. Nevertheless, the survey indicates a significant opportunity which has not yet been realized.

¹⁵ Marbek Resource Consultants and MK Jaccard and Associates Ltd (2006). *Demand Side Management Potential in Canada – Energy Efficiency Study*.

¹⁶ Canadian Manufacturers and Exporters, in association with Neill and Gunter Ltd and Marbek Resource Consultants Ltd., *Energy Performance Benchmarking and Best Practices in New Brunswick Industry and Manufacturing Sector-Final Report*, 2006.

¹⁷ The achievable potential considered measures that are both economic and practical, based on the opinion of various experts, including participants in an industrial sector workshop.

Exhibit 9
New Brunswick Industry Technical Best Practices Assessment¹⁸

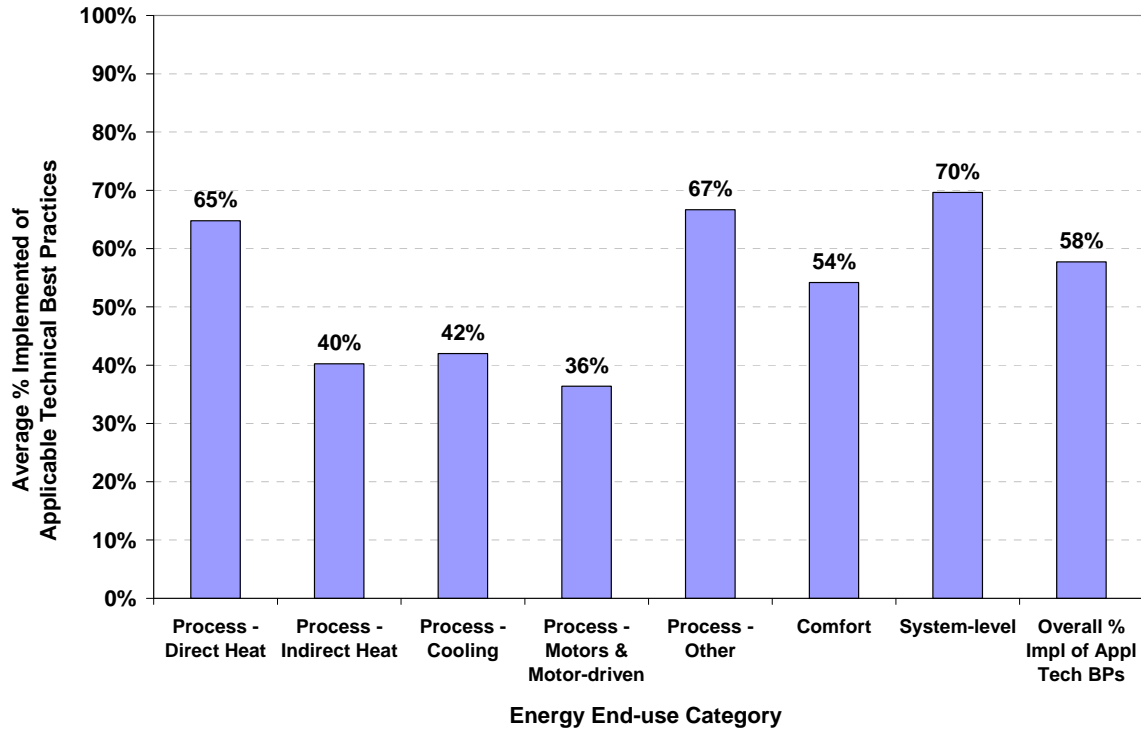
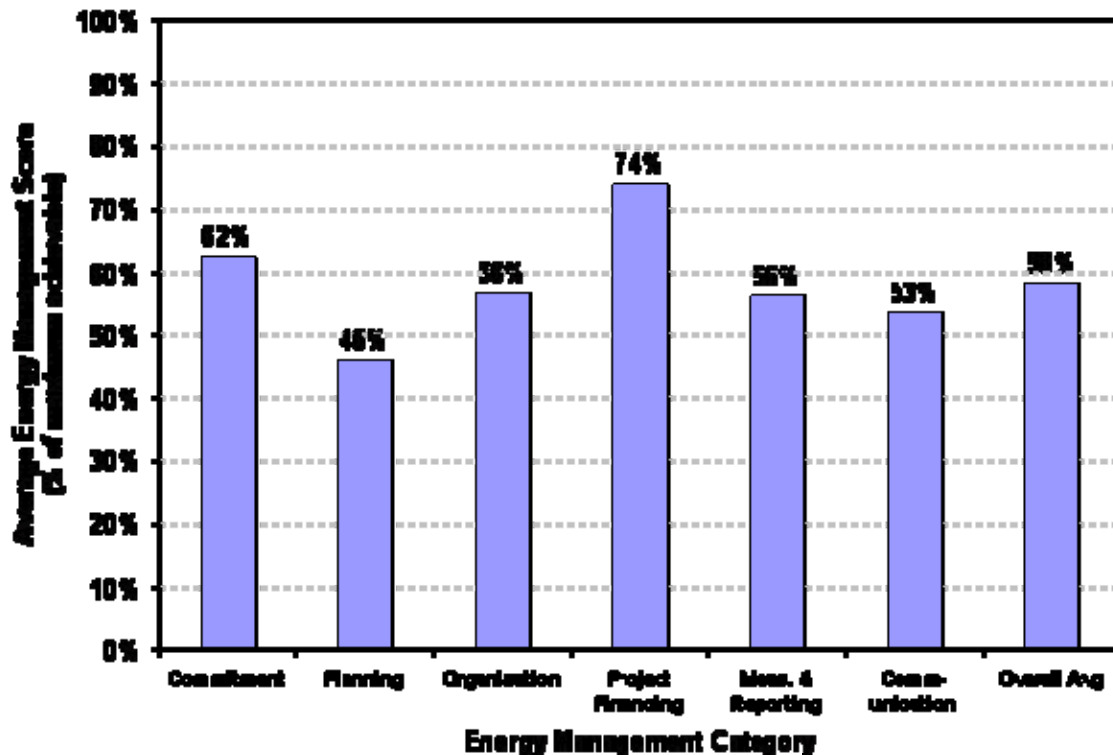


Exhibit 10 shows the same study's results for management best practices. The performance indicator shown on the Y axis is the average score calculated from an assessment of six “competency” categories: corporate commitment, corporate energy management planning, organization, project financing, measurement & reporting (Information Systems) and communication. As shown, with one exception (project financing), there is also a significant management best practices opportunity.

¹⁸ Ibid. The percentage reflects the average implementation rate of best practices in each category among all surveyed industries. For example, 65% for process – direct heat indicates that, on average, each individual facility is implementing 65% of all of the best practices related to process – direct heat that are applicable to that facility.

Exhibit 10
New Brunswick Industry Management Best Practices Assessment



Building on the findings of the technical and management best practices studies, there is additional evidence that basic practices such as energy metering are not being effectively applied by industry. Effective technical and management best practices rely on the availability of good information on energy use. In turn, this relies on data from energy metering (under the old adage of “you can’t manage what you can’t measure”). While some decisions do not require a lot of information on energy use (e.g. extensive metering is not necessary to appreciate the value of installing high efficiency motors), this information is often crucial to decision-making. Even in cases that are simple, the availability of accurate energy information is important to quantify and verify the benefits. In a recent study, 16 energy management engineering consultants and 5 energy managers (past and present) from Canadian industry were asked to rate how well energy metering is used to conduct key energy management functions.¹⁹

Energy metering was scored from 1 to 4, where 1 = Best Practice, 2 = Reasonably Well, 3 = Average and 4 = Below Average. The responses generated an average rating of 3.4, cutting across both the energy intensive and other types of industries. This is an indication that energy metering performance within Canadian industry is below average and, additional findings from

¹⁹ Marbek Resource Consultants Ltd., *Literature Review and Program Concepts for Industrial Energy Metering*, for the Office of Energy Efficiency, 2006. The survey considered two segments of industry: energy intensive and other (i.e., general manufacturing and assembly type operations).

the survey revealed that the ratings for each of the individual functions range no better than between *at average* to *below average*.

Poor performance in energy metering is in itself a manifestation of sub-optimal investment. More importantly, it significantly impedes the ability to construct business cases for other energy management investments. Based on the results from a needs assessment for the design and piloting of the NRCan Dollars to \$ense workshops, it was learned that two of the main barriers affecting the inability of corporate managers to gain access to internal project financing were: (1) a lack of facility metering which makes it difficult to accurately calculate energy savings; and (2) a lack of tools (e.g. spreadsheets, templates, methods) to fully value and account for the various benefits.²⁰

²⁰ Energy Performance Services Canada Inc., *Expanded Needs Analysis Report*, August 2005. Conducted for the OEE-IPD

5. BARRIERS AND OPPORTUNITIES

The energy efficiency gap varies significantly across industry and commercial sectors. At one extreme are the large industrial energy users (e.g. those that are most active in CIPEC) and large commercial property owners have recognized the need and have developed the capacity to manage energy. At the other extreme are small commercial establishments who have little awareness or capacity. In the first case, the gap is small but the amount of energy involved is large. In the second case, the gap is large but the amount of energy is relatively small. In between these two extremes are a large number of small to medium enterprises (manufacturing and commercial) who use significant amounts of energy but have not yet developed sophisticated energy management systems.

5.1 BARRIERS

There are a wide range of pervasive barriers that can impede cost-effective energy management investments. These can be classified according to the categories identified in the Energy Efficiency Working Group's (EEWG's) Foundation Paper. Examples include:

- **Uncertainty about the future of the facility.** A company that is uncertain about the future of a facility will often restrict capital spending. The uncertainty may be due to possible shutdown, major expansion/rebuild, product change or possible sale. This barrier is usually short term in duration but sometimes the period of uncertainty can last several years.
- **Other Priorities.** Sometimes very good improvement opportunities in energy efficiency are not considered because of other priorities for the management and technical staff. This may stem from two basic causes. The other priorities may be the result of poor overall management of operations in general (e.g. putting out “fires” due to poor maintenance or planning), not merely in the energy area. Or, the other priorities may be legitimate concerns (e.g. growing the business, developing new products and securing markets) and/or more attractive or compelling opportunities. This presents the two extremes of management, good and bad. In reality, there are degrees between the two extremes. Regardless of the management situation, there will always be other priorities competing with energy improvements. In some cases, it may also be that the business case for energy investments has not been argued convincingly.
- **Perception of energy as a strategic imperative.** When energy is viewed as a strategic issue, appropriate resources and systems are provided: energy use is monitored, performance indicators are created, improvement targets are set, and the organization is staffed to manage the issue. In an industry where energy is a major component of the costs, senior management are more likely to make energy management a strategic issue. For a company with a low energy component, energy will be viewed as a "cost of business" and as a result, some good investment energy projects may not happen. In some cases, energy may also fail to become a strategic issue because the corporate management paradigm has not evolved to appreciate the opportunities and their links to

productivity. In a 2004 survey, only 12% of managers viewed energy as a strategic issue.

²¹ While some of this may be explained by the inclusion of low-energy industries, it does suggest that there is room for improvement.

- **Lack of Staff and Expertise.** Some operations, even within large companies, may not have the staff on site to carry out the studies and engineering analysis to undertake improvement projects, energy or otherwise. Small companies may not have the technical resources to even identify the opportunity let alone implement the improvement. Even if staff is available, they may not have the training, the experience or the tools to maximize their contribution. Some of the aspects that may be lacking include: (1) energy metering; (2) ability to assess non-routine financing mechanisms, such as performance contracting; (3) techniques for calculating energy savings in a dynamic production or operating environment; and (4) ability to construct compelling business cases.²²
- **Inertia.** People are creatures of habit and those who work in companies are no exception. One of the greatest challenges of a senior manager in a large company is trying to change the course of the company. In general, European or Japanese operations have been more concerned with energy efficiency than their North American counterparts due to higher costs or shortages of energy. North America has had relatively cheap energy in comparison. While this advantage is changing and energy is being priced globally, companies must adjust their focus to this new reality. Successful, well managed companies will adjust more rapidly. This may manifest itself in different ways: lack of attention to this area, lack of expertise and resulting greater risk aversion for energy projects.
- **Wait and See Attitude.** For nearly ten years, industry has been facing the possibility of regulation to limit greenhouse gas emissions. Although it probably did not affect the building of new modern capacity, the uncertainty may have been a drag on the renovation of existing facilities for the energy conservation. The recent regulations have some limited allowance for credit for early action but this was not part of earlier drafts of the regulations. Now that the “shoe” has dropped, this problem should be resolved.
- **Return on Investment and Risk Premium.** Some corporate decision-makers appear to be imposing very stringent hurdle rates for ROI from energy management investments (three year payback or less). There is some debate as to whether hurdle rates are any higher for energy management investments than other investments of a similar nature. The reality is that the cost of capital for companies is high because equity demands higher returns. In addition, the ROI must compensate for a wide variety of risks, including cost overruns, and risks that the technology will not deliver the promised results. The question is whether the risk premium being assigned to energy efficiency investments is reasonable. The answer depends on management's perspective on the

²¹ Peter Garforth, president Garforth International llc, *Managing Energy Productivity-A Competitive Prerequisite*, 2005 ACEEE Summer Study on Industry

²² Energy Performance Services, *Expanded Needs Analysis-Report, Course Design-Financing Workshop-“Dollars to Sense Series”*-Office of Energy Efficiency (OEE) Natural Resources Canada

nature of such investments. If energy efficiency investments are perceived as speculative and having uncertain outcomes (e.g. comparable to investments in quality management), the risk premium may be unreasonably high. If, on the other hand, they are based on good measurements and reliable projections, and are perceived as such, the risk premium imposed on energy efficiency investments should be no different than for other investments in production improvements. Thus, part of the reason for the imposition of apparently high hurdle rates for energy efficiency investments may, in some cases, be an inaccurate perception that these investments are less likely to deliver tangible results.

- **Capital Allocation Processes.** According to one survey, almost one third of respondents indicated the need for a payback of one year or less.²³ In these cases, it is more likely that company capital allocation processes are to blame rather than high hurdle rates. For example, funding for some projects may be relegated to certain constrained budgets (e.g. sustaining capital vs. discretionary). If a budget is oversubscribed with non-discretionary items, the only way to justify the funding is if the project can pay back the investment in the current fiscal year. The capital allocation process has a great influence on which projects are approved. In some instances, even with a relatively good allocation process, some excellent projects will be delayed or fail to obtain approval due the inefficiency of the allocation process.
- **Lack of Capital.** A company may not have the financial resources to make the investment due to lack of profitability or high debt load. Any new investments will then be limited to the “staying in business” category, such as investment to meet environmental or safety regulations.
- **Access to Financing.** Financial institutions generally base their decisions on the creditworthiness of the company as opposed to the merits of individual projects. Consequently, smaller firms and/or Energy Service Companies (ESCOs) may have difficulty securing the financing necessary for larger investments. Although the development of new financial mechanisms is helping to alleviate part of the problem, most observers consider that, by themselves, these will not overcome the basic reluctance of financial institutions.²⁴
- **The Commercial Building Disconnect.** Exhibit 8 provided an illustration of the various actors and the key stages in the property lifecycle: design, financing, construction, letting and operation and sale. The term, “commercial building disconnect” embodies several key issue relating to commercial property management which together impede investments in energy management.

²³ Compass-Phase 3. *Survey Findings: Energy Efficiency Programs for SME's*. May 9, 2003

²⁴ Deloitte & Touche. *Financing Mechanisms for EE Investment*. June, 2002. Note: larger companies usually have a lower cost of financing and therefore no need for ESCO financing.

- The owner/manager-tenant disconnect: Approximately 80% of commercial space is leased and often owners and tenants find it difficult to get together on finding the best solution to reducing energy operating costs. Under net leases (which are common), owners/managers pass on the operating costs of running their facilities to tenants and hence, they are less likely to consider investments to improve energy performance. Moreover, tenants are charged on the basis of floor space rather than usage and, therefore, they also have little incentive to reduce energy use.
- The property valuation disconnect: There is a “green knowledge gap” between the design sector and those responsible for financing, appraising and leasing green buildings. The property appraisal community uses traditional valuation standards that do not recognize green features (such as energy efficient investments). Furthermore, lender understanding of sustainability is limited.²⁵ The result is that energy investments do not translate into higher rents or greater asset value.
- The institutional disconnect: There are substantial and widespread regulatory barriers and existing codes etc. that result in the less than optimal design of and construction of new commercial buildings.

5.2 OPPORTUNITIES

While the barriers are significant, there are also hopeful signs that the case for energy management is gaining ground. Some of the positive developments include:

- **Increased Understanding and Awareness.** Through efforts such as the NRCan and CIPEC sponsored *Dollars to Sense* Workshops, many more people in the corporate sector are gaining an appreciation of the opportunities for energy efficiency, the importance of metering, and the key concepts of energy management.
- **Adoption of Standardized Energy Management Systems.** Management best practices are increasingly being documented and disseminated. CSA first published a *Voluntary Energy Management Guideline* in 1995. Since then additional guidance has been developed by Energy Star (*Guidelines for Energy Management*), NRCan's Office of Energy Efficiency (*Energy Efficiency Planning and Management Guide*), as well as a variety of other governments.
- **More Financing Options.** Financing mechanisms, such as loans and leases, and including sophisticated variations such as performance contracting, project finance, securitization and non recourse off balance sheet financing, are providing greater choice and ability to meet the needs of organizations seeking capital for energy investments.

²⁵ Chris Corps, Asset Strategies and Doug Webber, Halsell Engineering, *Canadian Perspective-Green Progress in Canada*, a presentation to the Advancing Green Buildings meeting in LBL for the Commission for Environmental Cooperation, October 2006.

These mechanisms can offer significant advantages in some situations but they are not without limitations and drawbacks (see Exhibit 11).

Exhibit 11 **Outsourcing of Energy Management**

Outsourcing of advice, finance, engineering, construction and operations are some of the available options to overcome barriers to cost-effective energy investments. Each has advantages and drawbacks. For example:

- **Consulting Contracts.** The fee is not linked to the results. Hiring a firm to carry out an energy audit, make recommendations, engineer the improvements, and install the machinery on a cost plus basis or fixed fee would fall in this category. The owner bears the risk but has the greatest flexibility to meet the overall objectives.
- **Performance Contracts.** Usually the consultant does not guarantee a result but says that if there is no improvement there is no fee. This minimizes the risk, but can lead to a situation where the energy management consultant optimizes its own reward/effort ratio by taking the low hanging fruit with little effort. Thus, the company may have improved energy efficiency but at a very high cost (both in real terms and in terms of lost opportunities)
- **Contracting with an outside ESCOs to finance, engineer, and construct a facility.** The ESCO is paid through a share of the savings from the improved energy efficiency. The ESCO bears most of the risk, however, the outsourcing company must sign a long contract if this facility is dedicated to one company. Under accepted accounting rules, the cost of the project must show up as a liability on the balance sheet of the outsourcing company. The benefit to the outsourcing company is that they reduce their project risk (performance and cost) but must pay some of the benefit to the ESCO. If the ESCO is less risk averse or simply better at building the facility this could be a successful route for the outsourcing company to take. One downside is that as in the previous category, the ESCO can sometimes take a lower risk but less optimal solution. One place where this solution can be very effective is when the ESCO converts energy for several customers. For example, a common steam plant for several commercial buildings or utilizing waste heat from a factory to heat the adjacent housing community.

- **Growing Importance of Environmental Performance.** The corporate sector is embracing environmental performance as a means of responding to the expectations of customers, employees, shareholders and the public. Whether captured as part of the *Triple Bottom Line* or *Corporate Social Responsibility (CSR)*, there is a growing appreciation of non-financial benefits.
- **Monetization of Carbon Emissions.** The recent announcement of the *Clean Air Regulatory Agenda* has confirmed plans for intensity-based GHG reduction targets and for emissions trading. Although there is still some uncertainty about how intensity targets will be measured and how significant the market will be for GHG offset credits,

there seems little doubt that GHG emission reductions will now become monetized assets to be traded. This will contribute another benefit stream to the value proposition.²⁶

- **Improved Building Valuation Framework.** Property valuation is a standards-based business with centuries of experience and practice applicable to real and intangible property. It is required for stock exchanges, banks, government, and insurance and is used in more than 130 countries. As such, it can become a powerful means to bring value to green and energy efficient property. The Vancouver Valuation Summit 2007 (held in March 2007) brought together senior executives from influential bodies responsible for valuation standards with internationally recognized leaders and policy makers to discuss the key issues and challenges surrounding valuations and sustainability globally.²⁷ This was a landmark event that could put the property valuation industry on a pathway towards full valuation of green building development.
- **Availability of Support and Financial Incentives.** As shown in Exhibit 12, there are a wide range of existing government incentives and private sector mechanisms to assist with energy investments, and more are being developed.
- **Better Understanding of Marketing Principles.** All companies have an energy efficiency gap; however, the size of the gap will vary from one industry to another and between companies within an industry. Institutions that are mandated to encourage and assist companies in reducing the gap are in the business of marketing energy efficiency. In this respect, they are similar to companies that market and sell products and services to the corporate sector. They are trying to convince management to make an investment that will generate a return that will improve the profitability of the company. To be effective they must employ some of the marketing and management techniques that are commonly used by the industrial sector such as those listed in Exhibit 13.

²⁶ There is a concern, however, that in the short term, the focus on emissions will divert attention away from electric energy efficiency improvements. In theory, the Offset program will provide an incentive for electricity efficiency projects, however, the liquidity of the market for such offsets remains uncertain.

²⁷ Vancouver Valuation Summit Brochure and personal communications with Chris Corps, Asset Strategies

Exhibit 12 Financial Incentives and Mechanisms for Energy Management²⁸

Government Direct Measures

The ecoENERGY Efficiency Initiative is a component of the Canadian government's comprehensive ecoENERGY strategy to increase energy supply, reduce energy waste and reduce pollution from conventional energy sources. Introduced in 2007, the programs included in this initiative will see over \$375 million invested over four years for residential, commercial, transportation and industrial energy users across Canada. The ecoENERGY Efficiency Initiative includes the following components:

- The \$220 million ecoENERGY Retrofit program offers homeowners, along with smaller businesses and organizations, financial support to retrofit their homes, smaller buildings and industrial processes.
- The \$60 million ecoENERGY for Buildings and Houses encourages the construction and retrofit of more energy-efficient buildings and houses.
- The \$18 million ecoENERGY for Industry program aims to accelerate energy-saving investments and the exchange of best practices information within Canada's industrial sector.
- The \$22 million ecoENERGY for Fleets focuses on reducing fuel use and greenhouse gas emissions in commercial and institutional fleets through training and education, sharing of best practices, anti-idling campaigns, and evaluations to identify opportunities for improvements.

Government Tax Incentives

This includes Accelerated Capital Cost Allowances and the Canadian Renewable and Conservation Expenses (CRCE)

Private Sector Incentive Mechanisms

The options include:

- Special Purpose Vehicles (SPV)
- Energy Performance Contracts (EPC)
- Energy Service Companies (ESCO)
- Leases
- Securitization
- Venture Capital Financing
- Utility Incentives

²⁸ Assembled from EPS Canada, *CIPEC Workshop on Financial Incentives*. Updated with information from NRCan.

Exhibit 13 Energy Efficiency Marketing Principles

1. Know each industrial sector. Understand the business. This requires an investment in market research and the use of industry specialists. For example, to market to the chemical industry, employ someone with chemical industry experience. Ensure that the information is credible.
2. Understand each major customer. Who are the decision makers? What are their priorities? What is the status of their business? How do they compare to the industry average? Don't assume that a junior engineer is fully cognisant of investment policies of the corporation.
3. Segment the market. Group the industries and companies in relevant sectors that assist in develop relevant marketing programs.
4. Develop partnerships. Companies sell products that are used to improve energy efficiency. Share market research. Combine programs. This works well with other government agencies.
5. Prioritize. Focus on areas of the market that will bring the greatest results. Be selective in the implementation of programs.
6. Set objectives for the organization. Use management techniques to set relevant key performance indicators and objectives for the various departments of the organization.
7. Avoid being condescending. Help a manager make his business more profitable without making him look foolish.

This list is provided only to give a sense of type of organization required to effectively market energy efficiency.

6. KEY MESSAGES

The energy efficiency gap varies significantly across industry and commercial sectors. At one extreme are the large industrial energy users (e.g. those that are most active in CIPEC) and large commercial property owners have recognized the need and have developed the capacity to manage energy. At the other extreme are small commercial establishments who have little awareness or capacity. In the first case, the gap is small but the amount of energy involved is large. In the second case, the gap is large but the amount of energy is relatively small. In between these two extremes are a large number of small to medium enterprises (manufacturing and commercial) who use significant amounts of energy but have not yet developed sophisticated energy management systems.

- Overall the level of investment in energy management in industry and commercial enterprises remains sub-optimal.
- There are a number of management and technical best practices that could be adopted however there are a number of barriers which are preventing otherwise cost-effective investments. It is important that governments understand these barriers and tailor their programs accordingly.
- For investments to happen, the business case for energy management must be articulated in a compelling way. This should highlight all of the energy and non-energy benefits.
- Senior managers need to be convinced that energy is a strategic issue linked to productivity. They need to be convinced that investments in energy efficiency will yield tangible results.
- Improving energy management systems, including metering and reporting should be a priority.
- Commercial lease language and property evaluation approaches should evolve to facilitate the business case for energy management in buildings