Multi-Unit Residential Building Management

and the

ISO 14001 Standard for Environmental Management Systems

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PURPOSE

ISO 14001 is a relatively new, internationally recognized standard for Environmental Management Systems. This standard has been steadily gaining acceptance in a variety of industries and organizations. This research was conducted in order to find out whether ISO 14001 has a potential role to play in multi-unit residential building management.

Research methods for this report included the consultation of written and electronic documentation on property management systems, the environmental impacts of multi-unit residential buildings and the ISO 14001 standard. It also included interviews with people presently involved in property management and related industries in Canada, and experts on the ISO 14001 standard.

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EXECUTIVE SUMMARY

It has long been known that building design and construction can have a significant impact on the natural environment. From the energy crunch of the 1970's to the "green" buildings of the 1980's and 1990's, environmental issues have been at the forefront of many building industry discussions. Although the encouragement of environmentally sensitive building design is important, some environmental aspects of a building, such as energy consumption, are much more significant when calculated over the lifecycle of a building than during its initial construction phase. To address this situation effectively, day-to-day building operation and maintenance must also be managed in an environmentally responsible manner. This is of particular importance in the management of existing buildings that may not have been designed with the environment in mind.

One approach to managing the environmental aspects of any organization is to employ an environmental management system (EMS), such as ISO 14001. ISO 14000 is a series of international voluntary standards that provide a very generic framework that may be used by many types and sizes of organizations in order to establish and maintain an environmental management system. At this point, *ISO 14001: Environmental management systems – Specification with guidance for use,* published in 1996, is the major document of the ISO 14000 series, and the only one with specific requirements. ISO 14001 has been adopted as a National Standard of Canada CAN/CSA-ISO 14001-96 by CSA International.

The process for the implementation of ISO 14001 begins with an initial assessment of the organization's environmental aspects and impacts. Based on this assessment, systems are developed to implement the three main requirements of the standard: legislative compliance, prevention of pollution and continual improvement. For reference purposes, a copy of the standard may be found in Appendix B.

The purpose of this report was to investigate whether ISO 14001 may be of value to the residential property management industry and, if so, to present a preliminary assessment of how it can be implemented. The main research method included a survey conducted through a series of interviews with people directly involved in managing residential apartment buildings, condominium complexes, offices, and commercial properties. Other people interviewed were government employees, ISO 14000 experts, product and services suppliers, health and environment experts, and property management association members. Additional information in the report was gathered from a variety of printed and electronic sources, and from members of an advisory board made up from industry representatives.

Early in the report, background information is provided in order to brief the reader on how the residential property management industry is structured. Various residential building management scenarios, including non-profit and for-profit buildings, housing co-operatives and condominiums are discussed, and the key players in the industry are introduced. Currently available building management resources including books and computer software are listed, along with related industry associations. This information is included to clearly define existing property management systems that may influence the way in which ISO 14001 could be applied to the industry.

Table 1 within the report outlines the environmental aspects of residential building components and systems, and identifies which participants within the industry may influence the environmental performance of each component. The main environmental aspects are energy and water consumption, indoor air quality, generation of greenhouse gases, air pollutants and solid waste. Other key aspects include the use of hazardous materials and ozone-depleting substances, and increased stormwater runoff from outdoor paved areas.

Some of the building environmental performance assessment programs (BEPAs) are also introduced in this section as examples of existing methods of assessment. Legislation and regulations related to residential property management and the environment are examined briefly, since legislative compliance is one of the key elements of ISO 14001.

The ISO 14000 series of standards is outlined in Section Three, with a focus on ISO 14001 and its requirements, its history and the level of international acceptance. Currently, the world leaders in ISO 14001 registration are Germany and Japan. In terms of number of ISO 14001 registered organizations relative to Gross National Product, Canada ranks thirty-third in the world. As well, the implementation of the standard is being driven by the automobile industry. In September 1999, General Motors, Ford and Daimler Chrysler, three major automobile manufacturers, announced their goal to require all their suppliers and support facilities to be registered under ISO 14001 by 2003. It is predicted that ISO 14001 certification will become an increasingly valuable business asset in many industries, especially for those companies pursuing trade on an international level. This raises the question of property management as an international commodity. Although the international marketplace may not appear to have a direct relationship with residential property management, the growing number of real estate management companies that hold international portfolios may change this.

The results of interviews with individuals in property management and related industries and ISO 14001 experts are presented in Section Four of the report. Survey questions were based on the five key elements of the standard: environmental policy, planning, implementation and operation of an environmental management system, checking and corrective action, and management review. In general, participants from the industrial, commercial and institutional (IC&I) sector had more clearly defined policies, established more targets, were more aware of the environmental aspects of property management, and had more experience with BEPAs than those from the residential sector. Few of the residential participants were aware of the ISO 14001 standard. Most participants thought that an EMS would be beneficial to medium-sized or large organizations. A complete list of interview questions and tabulated responses are included in Appendix E and Appendix F.

Section Five outlines how the ISO 14001 framework can be integrated into building management structures by reviewing the roles of each of the key players in the industry. A detailed summary of the general requirements of the ISO 14001 standard, with a description of how each clause may be applied to residential building management is presented in Table 2. The main role of building owners and senior executives of management companies is one of commitment to the standard. More practical aspects of implementation are the responsibilities of managers. Contractors and consultants under the supervision of the managers must also conform to the requirements of the standard. In addition, tenants also have an important role to play, although this may be difficult to enforce unless it is made a part of a contractual agreement such as a lease.

A brief case study of Canterra Tower, a Calgary office building that is currently the only North American building to be registered under ISO 14001, is presented in Section Six. The benefits realized by Canterra Tower as a result of its environmental initiatives include better indoor air quality, and a reduction of energy consumption and solid waste generation. This has resulted in a reduction in operating costs for the building. Also in this section, the five key elements of the standard ISO 14001 are addressed in terms of residential building management. The key elements are policy, planning, implementation and operation, checking and corrective action, and management review. Table 3 describes the potential role that BEPAs may play in the implementation of ISO 14001. These tools may assist in the assessment of a building's environmental impact and aid in defining environmental objectives as well as measure continual improvement.

A discussion of the need for environmental management systems concludes the report in Section Seven, along with a list of opportunities ISO 14001 presents to the residential property management industry and possible barriers that may limit its acceptance.

Key opportunities presented by ISO 14001 include:

- Sustainable development and environmental performance;
- Being able to meet the needs of people with environmental hypersensitivity;
- Promotion of voluntary environmental standards and self-regulation;
- Readiness for real estate management in the international marketplace;
- Improved building performance and technical innovation
- Housing affordability through operational cost savings;
- Internal management efficiency;
- Improved public image; and
- Meeting vendor certification criteria.

Key barriers to the acceptance of ISO 14001 include:

- Lack of awareness;
- Time and effort required;
- Requirement for additional documentation;
- Additional training requirements of employees;
- Initial expense;
- Lack of availability of suppliers and contractors who meet environmental criteria;
- Requirement that company policies be open to public scrutiny;
- Skepticism in the industry of the standard's marketability;
- Perceived lack of credibility of a standard that requires a commitment to action without prescribing specific performance levels;
- The generic nature of the standard;
- The need for information and assistance;
- Lack of knowledge within the industry of environmental aspects and impacts; and
- Lack of protocol in terms of standardized methods of testing.

One of the more controversial aspects of ISO 14001 and residential property management is the role that tenants may play in the implementation of the standard, and the effect that it may have on their lives. This issue, along with other issues such as the legal aspects of property management and the environment, is also discussed in the conclusion of the report.

Recommendations are made in Section Eight of the report. The key recommendations are that:

- Residential property managers need to be educated about ISO 14001. Possible vehicles for education include conferences, workshops and association newsletters.
- Government incentives would aid in the implementation of ISO 14001.
- Unregistered participation should be considered by those unable to afford complete registration.
- If a property management organization decides to implement the standard, it should be done gradually, using existing management mechanisms if possible, with clear communication between all people involved.
- Further study of this subject is necessary. It may be beneficial to employ focus groups and pilot projects in order to produce specific guidelines for the implementation of ISO 14001 in residential property management.

This report will be of interest to anyone in residential property management and sustainability. Although it is possible that only medium to larger property owners or management companies will find ISO 14001 certification cost-effective, the report provides valuable information for anyone interested in setting up an environmental management system for a multi-unit residential building based on the requirements of the standard.

RÉSUMÉ

Depuis longtemps, nous savons que la conception et la construction de bâtiments peuvent avoir des effets importants sur l'environnement naturel. De la crise énergétique des années 70 aux immeubles « verts » des années 80 et 90, les questions environnementales se sont retrouvées au centre de nombreux débats concernant le secteur du bâtiment. Bien qu'il soit important d'encourager la conception et la construction d'immeubles en se souciant de l'environnement, certaines caractéristiques d'un immeuble, notamment sa consommation énergétique, ont un impact plus important sur l'environnement que sa construction en raison de la durée de vie de l'immeuble. Pour s'attaquer efficacement au problème, les travaux et l'entretien quotidiens d'un immeuble doivent aussi être réalisés en respectant l'environnement. Cette question est particulièrement importante lorsqu'il s'agit de gérer des immeubles existants qui n'ont pas été conçus en fonction de l'environnement.

Une des approches préconisées pour la gestion des activités environnementales d'une organisation est l'adoption d'un système de management environnemental (SME) tel l'ISO 14001. La série ISO 14000 est un ensemble de normes internationales mises en œuvre volontairement, qui tracent un cadre général dont peuvent se servir des organisations de toute taille et de toute vocation pour implanter et maintenir un système de management environnemental. À l'heure actuelle, la norme *ISO 14001 : Systèmes de management environnemental – Spécifications et lignes directrices pour son utilisation*, publiée en 1996, est le document principal de la série ISO 14000 et le seul comportant des exigences précises. L'ISO 14001 a été adoptée à titre de norme nationale du Canada CAN/CSA-ISO 14001-96 par CSA international.

Le processus de mise en œuvre de l'ISO 14001 commence par une évaluation des caractéristiques et des activités environnementales de l'organisation. À la lumière de l'évaluation, des systèmes sont élaborés pour répondre aux trois principales exigences de la norme : la conformité aux lois, le contrôle de la pollution et l'amélioration continue. À titre de référence, vous trouverez le texte de la norme à l'annexe B.

Le présent rapport cherche à savoir si l'ISO 14001 peut s'avérer utile au secteur de la gestion immobilière résidentielle et, si tel est le cas, à présenter une évaluation préliminaire sur la façon de la mettre en œuvre. Pour ce faire, une enquête a été menée grâce, entre autres, à une série d'entrevues réalisées auprès de personnes directement liées à la gestion d'immeubles d'appartements, d'ensembles de logements en copropriété, d'établissements commerciaux et d'immeubles à bureaux. Des fonctionnaires, des spécialistes de l'ISO 14000, des fournisseurs de produits et de services, des experts de la santé et de l'environnement, ainsi que des membres d'associations de gestion immobilière ont également été consultés. Les renseignements supplémentaires qui figurent dans le rapport proviennent de divers documents imprimés et électroniques, ainsi que de membres d'un conseil consultatif formé de représentants du secteur.

Les renseignements généraux présentés au début du rapport permettront au lecteur de se familiariser avec la structure du secteur de la gestion immobilière résidentielle. Divers scénarios de gestion immobilière résidentielle concernant, entre autres, des immeubles à but lucratif et sans but lucratif, des coopératives d'habitation et des immeubles en copropriété sont abordés, et les principaux intervenants du secteur sont présentés. On y énumère également les ressources relatives à la gestion immobilière actuellement disponibles, dont des livres et des logiciels, accompagnées d'une liste des associations liées au secteur. Ces renseignements serviront à cibler les systèmes de gestion immobilière existants qui pourront jouer un rôle dans l'application de l'ISO 14001 au sein du secteur.

Le tableau 1 du rapport montre les effets des composants et des systèmes relatifs à la construction résidentielle sur l'environnement et identifie les acteurs du secteur pouvant influer sur la performance environnementale de chaque composant. Les principales questions touchant l'environnement sont la consommation d'énergie et d'eau, la qualité de l'air ambiant, les émissions de gaz à effet de serre, les polluants atmosphériques et les déchets solides. Parmi les autres aspects importants, on trouve l'utilisation de matériaux dangereux, les substances appauvrissant la couche d'ozone et l'augmentation du ruissellement pluvial provenant des surfaces extérieures revêtues.

Également, afin d'illustrer diverses méthodes d'évaluation, certains programmes d'évaluation de la performance des bâtiments sur le plan de l'environnement (PEPBE) sont présentés dans ce chapitre. Puisque la conformité aux lois est l'un des points importants de l'ISO 14001, la législation et les règlements visant la gestion immobilière et l'environnement sont brièvement examinés.

Le troisième chapitre présente la série ISO 14000 en s'attardant particulièrement sur l'ISO 14001 et ses exigences, son historique et son niveau d'acceptation à l'échelle internationale. À l'heure actuelle, les chefs de file en ce qui a trait aux enregistrements sous ISO 14001 sont l'Allemagne et le Japon. Pour ce qui est du nombre d'organismes enregistrés sous ISO 14001 par rapport au produit intérieur brut, le Canada se classe trente-troisième à l'échelle mondiale. De plus, c'est l'industrie automobile qui domine quant à la mise en œuvre de la norme. En septembre 1999, General Motors, Ford et Daimler Chrysler, trois grands fabricants d'automobiles, dévoilaient leur objectif d'exiger que tous leurs fournisseurs et toutes leurs installations de soutien soient enregistrés sous ISO 14001 d'ici 2003. On prévoit que, de plus en plus, la certification ISO 14001 deviendra un atout commercial dans de nombreux secteurs économiques, particulièrement pour les entreprises présentes sur les marchés internationaux. Cette observation soulève la question de la gestion immobilière en tant que produit international. En effet, même si le marché international ne semble pas avoir de lien direct avec la gestion immobilière résidentielle, le nombre croissant d'entreprises de gestion de propriétés immobilières détenant un portefeuille international pourrait bien changer cette réalité.

Au quatrième chapitre, on trouve les résultats des entrevues avec les personnes évoluant dans le domaine de la gestion immobilière et les secteurs connexes, ainsi qu'avec les spécialistes de la norme ISO 14001. Les questions portaient plus précisément sur les cinq

éléments clés de la norme : la politique environnementale, la planification, la mise en œuvre et le fonctionnement d'un SME, les activités de surveillance, les actions correctives de même que la revue par la direction. De manière générale, par rapport aux participants du secteur résidentiel, ceux des secteurs industriel, commercial et institutionnel possèdent des politiques mieux définies, établissent des objectifs plus précis, montrent une meilleure connaissance des questions environnementales entourant la gestion immobilière et possèdent une plus vaste expérience quant aux PEPBE. Un petit nombre seulement des participants du secteur résidentiel connaissaient la norme ISO 14001. La plupart des participants estimaient qu'un SME serait avantageux pour les grandes et moyennes entreprises. Les annexes E et F comportent la liste complète des questions posées lors des entrevues, accompagnées des réponses sous forme de tableau.

Le cinquième chapitre aborde la méthode d'intégration du cadre de l'ISO 14001 aux structures de la gestion immobilière en examinant le rôle de chaque acteur principal du secteur. Le tableau 2 comporte un sommaire détaillé des exigences générales de l'ISO 14001 accompagné par des suggestions sur la façon d'appliquer chaque disposition au sein de la gestion immobilière. Le rôle principal des propriétaires d'immeubles et des cadres de direction des entreprises de gestion en est un d'engagement envers la norme. De leur côté, les gestionnaires sont chargés des aspects pratiques de sa mise en œuvre. Les entrepreneurs et les experts-conseils, sous la supervision des gestionnaires, doivent aussi répondre aux exigences de la norme. De plus, les locataires ont également un rôle important à jouer, bien que ce dernier soit difficile à faire valoir, à moins qu'il ne soit clairement indiqué dans une entente contractuelle telle qu'un bail.

Le chapitre six présente la brève étude de cas concernant Canterra Tower, un immeuble à bureaux de Calgary, actuellement le seul en Amérique du Nord à être enregistré sous ISO 14001. Parmi les avantages résultant des démarches environnementales entreprises par Canterra Tower, on a observé l'amélioration de l'air ambiant et la réduction de la consommation d'énergie et de la production de déchets solides. Grâce à ces améliorations, l'immeuble a réduit ses coûts d'exploitation. Également dans ce chapitre, les cinq éléments essentiels de la norme ISO 14001 sont traités en relation avec la gestion immobilière résidentielle. Les éléments clés sont les lignes directrices, la planification, la mise en œuvre et le fonctionnement, le contrôle et les actions correctives, ainsi que la revue par la direction. Le tableau 3 décrit le rôle que pourraient jouer les PEPBE dans la mise en œuvre de l'ISO 14001. Ces outils pourront aider à évaluer les effets d'un immeuble sur l'environnement et à définir les objectifs environnementaux ainsi que les mesures visant l'amélioration continue.

Le chapitre sept termine le rapport en abordant la nécessité d'implanter des systèmes de management environnemental et en présentant les avantages qu'offre l'ISO 14001 à l'égard du secteur de la gestion immobilière résidentielle et les obstacles qui pourraient nuire à son acceptation.

Les principaux avantages qu'offre l'ISO 14001 sont :

- le développement durable et la performance environnementale;
- la capacité de répondre aux besoins des personnes hypersensibles à l'environnement;
- la promotion de normes environnementales volontaires et d'auto-réglementation;
- la préparation à la gestion immobilière sur les marchés internationaux;
- la performance améliorée du bâtiment et les innovations technologiques;
- l'abordabilité du logement par le biais de la réduction des coûts d'exploitation;
- la gestion interne efficace;
- l'amélioration de l'image corporative;
- la conformité aux critères de certification des fournisseurs.

Les principaux obstacles relatifs à l'acceptation de l'ISO 14001 sont :

- le manque de sensibilisation;
- le temps et les efforts à investir;
- le besoin de documentation supplémentaire;
- la formation supplémentaire des employés;
- les dépenses initiales;
- le manque de disponibilité de fournisseurs et d'entrepreneurs répondant aux critères environnementaux;
- l'obligation de rendre publiques les politiques de l'entreprise;
- le scepticisme au sein du secteur quant au potentiel de commercialisation de la norme;
- le manque de crédibilité perçu envers une norme qui requiert un engagement sans établir des objectifs spécifiques de performance;
- le besoin d'information et d'assistance;
- le manque de connaissance au sein du secteur concernant les questions environnementales et leurs effets;
- l'absence d'un protocole sur les méthodes normalisées de vérification.

L'un des aspects les plus controversés de l'ISO 14001 au sein de la gestion immobilière résidentielle est le rôle des locataires dans la mise en œuvre de la norme et les répercussions qu'elle pourrait avoir sur leur vie. Cette question, ainsi que d'autres questions reliées à l'aspect juridique de la gestion immobilière et à l'environnement, font aussi l'objet d'un examen dans la conclusion du rapport.

Voici la liste des principales recommandations proposées dans le huitième chapitre du rapport :

- Les gestionnaires immobiliers résidentiels devront recevoir une formation portant sur l'ISO 14001. Parmi les principaux moyens de formation, on retient les conférences, les ateliers de travail et les bulletins d'associations.
- Des mesures incitatives du gouvernement aideraient à la mise en œuvre de l'ISO 14001.

- La participation non enregistrée devrait être offerte à ceux qui ne peuvent se permettre l'inscription complète.
- Si un organisme de gestion immobilière décide de mettre en œuvre la norme, le processus devrait se faire de manière graduelle à l'aide des mécanismes de gestion existants si possible, en favorisant une communication efficiente entre les participants.
- Des recherches plus approfondies sur le sujet sont nécessaires. Il pourrait s'avérer avantageux de recourir à des groupes de discussions et à des projets pilotes afin d'élaborer des lignes directrices précises pour la mise en œuvre de l'ISO 14001 au sein de la gestion immobilière résidentielle.

Le présent rapport saura intéresser toute personne évoluant dans les domaines de la gestion immobilière et du développement durable. Il est possible que seuls les propriétaires ou les entreprises de gestion immobilière de moyenne ou de grande taille considèrent la certification ISO 14001 comme rentable. En revanche, le rapport fournit des renseignements précieux pour les personnes intéressées à mettre en œuvre un système de management environnemental pour un collectif d'habitation fondé sur les exigences de la norme.

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1.0 INTRODUCTION

As concern grows for maintaining and improving the quality of our natural environment and protecting human health, organizations of all types and sizes are turning their attention to the potential environmental impacts of their activities, products and services. Residential building management should be no exception. Unfortunately, at the present time there is no broadly practiced system for environmental management within the residential building management industry.

The Environmental Management Institute (EMI) believes that residential building management is an industry that can benefit greatly from the implementation of standardized environmental management systems (EMSs). Achieving sound environmental performance requires a systematic approach, and should include methods to ensure legislative compliance, prevention of pollution and continual improvement. Environmental management practices should be incorporated into an organization's existing overall management system.

The objective of this research is to identify whether or not the International Standard ISO 14001, Environmental Management Systems – Specification with Guidance for Use, adopted as a National Standard of Canada CAN/CSA-ISO 14001-96, a methodical guide for an EMS, has a role to play in residential building management. In addition to identifying whether there is a place for the international standard in residential building management, the research attempts to make a preliminary investigation into identifying the nature of that role.

The results of the research are considered to be extremely important to the residential building management sector, since they indicate potential for:
economic gains through cost-effective improvements in energy efficiency and waste management;
better treatment of the environment;
improved health and well-being of residential building tenants.

The investigation of ISO 14001's application to the building management is very timely. The building management industry is moving away from a "command and control" approach to reducing environmental impacts towards more voluntary self-regulation. The ISO series of voluntary, international standards are well suited to this shift in industry trends.

In addition, it is clear that both industry and government recognize the need for understanding the Standard in the context of different industry sectors. Currently, the Ontario Ministry of the Environment (MOE) is managing a project to develop sector-specific guides for ISO 14001 implementation into the office building, hospital, municipal, and school management sectors. The project is being done in partnership with CSA International (formerly the Canadian Standards Association), Union Gas and Enbridge Consumers Gas.

The ISO 14001 framework complements two major operational goals of residential building management: the maximization of return on investment, and legislative compliance. Because the standard is designed with both the industry and the environment in mind, there is an enormous potential to realize economic benefits through more efficient use of resources. In addition, the standard has been recognized by courts of law, and can provide building managers with a solid and internationally recognized means of demonstrating due diligence in environmental matters.

2.0 MULTI-UNIT RESIDENTIAL BUILDING MANAGEMENT

2.1 Overview

In order to define the contributions ISO 14001 can make to the residential building management industry, it is necessary to understand the basic structure of residential property management, and the environmental impacts of residential buildings. This section of the report describes the most common residential building management arrangements and the roles of key players in the building management industry. It also outlines current management practices and systems, with a focus on typical management policies, resource material including publications and software, and associations related to building management. A summary of the environmental impacts of residential buildings is presented, along with a short list of related legislation and regulations.

2.2 Residential Building Management Arrangements

"Management is composed of theory, principles and practice. Theory and principles represent a body of knowledge that is the science of management, but the application of such knowledge is the art of management practice."[1]

The two main types of MURB addressed in this report are apartment buildings and condominium complexes. These properties may be owned and managed in a variety of ways, with management systems and policies designed to reflect the motives of the owners. The four categories of property management arrangements studied in this report are Profit, Non-Profit, Condominium, and Co-operative.

Although each management organization sets its own policies and develops its own management systems, there are common elements within each of the major types of residential property management. Some of the similarities are due to laws or government guidelines. Others are due to similar goals and objectives. The following subsections provide brief descriptions of each type of arrangement, along with some background information on their typical management structure and policies.

2.2.1 For Profit

Most "for profit" apartment buildings are managed by private companies. In most cases, the owner hires a property management company to provide all necessary services. Depending on the agreement between the owner and the property management company, these services may encompass a number of different duties, ranging from simple rent collection to providing all required maintenance for a building. Some of the possible duties involved are listed in Section 2.3. Since profit is the major motivator for this type of building, the role of the "for profit" property manager is to maximize the building owner's investment while minimizing operating costs. The goal, then, is to maintain and create value in real property.[2]

Most large, privately operated "for profit" property management groups develop their own sophisticated property management systems stemming from legislative and regulatory requirements set forth by various organizations. Policies may be developed to reflect the financial objectives of the company, and to keep abreast of market trends. Because of the competitive nature of their business, private companies are not often willing to divulge the intricacies of their management policy to the public. This may create somewhat of a barrier to the implementation of ISO 14001, which requires the company's environmental policy to be made available to the public.

Residential property management companies, or property management divisions of larger companies, typically follow the general organizational pattern presented in Figure 1 on page 8. The number and size of the properties that a company manages determine the distribution of responsibilities within its organizational structure.

Within Canada's metropolitan areas and major urban centres, there are over 65,000 privately owned MURBS of six units or greater, housing nearly 1,434,000 apartments. Of these, nearly 470,000 apartments are located in 5168 buildings having over 50 units, and nearly 185,000 apartments are in 676 buildings of more than 200 units.[3]

2.2.2 Non-Profit

The end of federal public housing programs in 1974 led to the development of non-profit housing: a form of housing owned and operated locally by municipalities or community non-profit agencies. Operating on the basis of fulfilling a social need, the main priority of non-profit property management is to create and maintain affordable housing for low to middle income tenants. Non-profit housing generally accommodates both subsidized and market-rent tenants. Rent costs may be geared-to-income and thus be assessed on an individual basis.

In general, a Board of Directors is the governing body in a non-profit management structure The Board of Directors establishes the overall corporate strategy and direction, and is responsible for community relations. An Executive Committee, which reports to the Board, manages day-to-day activities. A personnel committee may look after human resources management. Other standing committees with supporting departments may also include Rental, Finance, Maintenance or Property Management, Development, Membership and Communications.

A significant characteristic of non-profit management structure is the level of tenant involvement in the management of the property. Tenant committees are quite common, and most non-profit organizations require that there be at least one tenant on the Board of Directors.[4]

Two examples of publications documenting typical non-profit housing management practices are:

- ***City Living,* Policy and Procedure Manual. *City Living***

Using guidelines supplied by the Ontario Ministry of Municipal Affairs and Housing (OMMAH) as a framework, City Living, an Ottawa non-profit housing group, developed its own property management manual. This manual outlines policies and procedures concerning tenant selection, rent determination, maintenance, administrative requirements, and includes a complete index of various letters, charts, reports, and forms, for both internal and external use.

- ***Centretown Citizens Ottawa Corporation, CCOC Board Briefing Book. Centretown Citizens Ottawa Corporation***

Another Ottawa non-profit housing organization, Centretown Citizens Ottawa Corporation (CCOC) has also adopted the guidelines presented by OMMAH and built a property management practice around it. A briefing book presented to the members on the Board of Directors outlines the structure, policies, and practices of the CCOC. While the book is not a procedural manual, it does present a picture of how the CCOC manages residential properties. According to Glenn Allen, maintenance co-ordinator at CCOC, many of the procedures and policies that exist are transferred by word of mouth and have evolved through experience. The structure of the organization is based on committees. There is a committee and supporting department for each of the following:

Development – Property acquisition and development, zoning and land use issues.
Finance – Accounting, budgeting and investment planning.
Rental – Deals with new tenants, marketing and dispute resolution.
Property Management - maintenance and improvement of physical properties.
Membership and Communication - tenant and volunteer participation, corporate records.

These additional standing committees, and the Board of Directors, are not directly represented by staffed departments, but direct or liaise with staff from all departments as appropriate:

Personnel - Human resources management.
Executive - interim review and implementation of operations.
Board of Directors - overall corporate strategy and direction, community relations.

Legal issues are the responsibility of whichever department is most directly affected, defaulting to the executive committee. The specific roles of all departments and committees are described in greater detail within the Board Briefing Book. Currently, CCOC is considering the preparation of a complete policy and procedure manual based on the systems already in place.

2.2.3 Condominium

In property law, a condominium is defined as the ownership of a dwelling unit in a multi-occupant building, with a percentage share of ownership of common elements (such as land, corridors, elevators, heating equipment, etc). Each unit may be financed or sold separately by the owner, as in private housing, but the care and expense of maintaining and operating common areas are shared.

Condominium housing became popular in the mid-1970s as an affordable alternative to purchasing a house. Although they are still used by many as an affordable way to enter the housing market, today condominiums have become a preferred option when age, time or lifestyle makes maintaining a house unattractive. For this reason luxury and retirement condominium communities are booming today.[5]

Condominiums are self-managed properties with a similar management structure to co-operatives. The structure of the association and the management of each condominium is unique, but must be developed in conformance with provincial condominium legislation.

Management decisions are made by an elected Board of Directors. During the sales program, the Board of Directors is controlled by the developer, and represents the developer's interests. As the individual units are sold, the Board of Directors is turned over to an association representing the interests of the tenant owners.

Most units in a condominium will be owner-occupied, but sometimes a multi-unit residential development will contain both privately owned and occupied condominium units as well as rental units. Units may be leased by individual or corporate owners. In this case, the board of directors is made up of members representing the interests of privately owned condominium units and representatives of the developer who owns the rental units. Depending on the number of units still owned by the developer and the requirements of the provincial legislation, the developer may or may not retain control of the Board of Directors. If any of the individually owned units in a building are also rented out, it remains critical that the owners of these units remain active in the management of the condominium, so that their interests and the interests of their tenants are still addressed by the Board of Directors.

A condominium's Board of Directors usually hires an outside property management firm to look after the day-to-day affairs of the condominium corporation, including both the physical maintenance of the

building and financial management. The property management firm is also responsible for the enforcement of the corporation's Declaration, by-laws, rules and regulations and for ensuring compliance with governing legislation. It is interesting to note that in condominium management, the relationship between the tenant and the condominium manager can also be viewed as being, although indirectly, an employer-employee relationship.

2.2.4 Co-operative

In a co-operative housing arrangement, the technical owner of the building is a corporation, of which each tenant holds a share. The property is managed through a democratic process by a board of directors, and residents may be expected to contribute time and labour to the co-operative. Tenants have the right to permanent residency as long as the obligations of their membership are met. Most co-operatives hire help to look after day-to-day management tasks such as bookkeeping and maintenance. Some co-operatives choose to hire their own employees, while others call on property management companies.

As a result of being managed by the tenants themselves, co-operative housing developments typically promote a strong sense of community. According to the Co-operative Housing Federation of Canada (CHF Canada) more than 250,000 people across Canada live in nearly 89,000 co-operative homes.[6]

Co-operative housing policies must comply with the requirements of provincial Co-operative Corporations or Co-operative Associations Acts. These acts, which apply not only to housing co-operatives, but other co-operative ventures as well, specify how a co-operative is to be organized, how decisions are to be made, and requirements for meetings.

A co-operative may also elect to establish its own by-laws or policies in addition to these requirements. Some provinces require a co-operative's bylaws to be approved by the provincial government ministry before they may be implemented. In these provinces, many co-operatives choose to set policies rather than bylaws for day-to-day management issues, since policies do not fall under provincial jurisdiction. Bylaws or policies may be established for a variety of issues, such as occupancy, managing arrears, parking and pets. Some co-operatives have extensive bylaws, while others have a minimal number. Co-operatives that receive government financial assistance must also comply with operating agreements they have made with the body that provides their funding. The requirements of the funding body may be adopted as bylaws by the co-operative.

An apartment cooperative differs from a condominium in that a cooperative is owned by a corporation in which the tenants hold shares, while condominium units are each privately owned by a tenant. Typically, a co-operative has an elected board of directors who act on behalf of the members. Member committees devoted to special areas of concern to the co-operative may act as advisors to the board of directors. For example, the Conservation Co-operative Incorporated, an Ottawa co-operative founded on the principles of promoting an environmentally responsible lifestyle, has an environmental committee. The Shefford Heritage Housing Co-operative, also located in Ottawa, has a committee devoted to the conservation of the co-operative's historic building.

Local, regional and national co-operative associations provide resource material, support and advice for co-operatives to help them formulate their own policies. CHF publishes resource documents for co-operatives on a variety of subjects, including sample by-laws.

2.3 Key Players in the Building Management Industry

The key players in the building management industry are owners, asset managers, property managers, building managers, superintendents, rental mangers, support staff, contractors, consultants and tenants. The number of these people involved with the management of any building will depend on the size of the

building, and the scale of both the property management company and the company that owns the building. Properties owned or managed by larger companies will have more levels of management and in-house support staff than smaller groups or individuals.

Another player in the building management industry is the investor. With the rise of Real Estate Investment Trusts (REITs) there is now a potential for having many arms-length investors who own shares in a portfolio of buildings.

The roles and responsibilities of each player are as follows:

2.3.1 Owners

Buildings may be owned by individuals, private firms, corporations, non-profit groups or government bodies. With the rise of REITs, the owner may be a group of investors who own shares in a real estate portfolio and operate at arm's length from the building.

The owner of a rental property is the landlord or the lessor of the property. In some cases, the owner contracts out the continuous work required to manage a building to a property management company. In other circumstances, property management is handled "in house" by staff hired directly by the owner.

2.3.2 Asset Managers

Asset management can be defined as: "the process of maximizing value to a property or portfolio of properties from acquisition to disposition, within the objectives defined by the owner."[7] Whereas property and building managers focus mainly on building operations, asset managers bear the responsibility for all aspects of the property from acquisition through to the sale of the property. In addition to negotiating the purchase and sale of property on behalf of the owner, and positioning assets within local markets, the asset manager is also typically responsible for the following:[8]

- Financing.
- Cash management.
- Building operating systems.
- Staffing levels.
- Risk management and insurance.
- Federal, state and local regulations.
- Accounting and taxation.
- Tenant retention.
- Aesthetics.

2.3.3 Property Managers and Building Managers

The titles *property manager* and *building manager* are commonly used interchangeably. This is primarily due to the fact that the job descriptions are very similar. The main distinction between the two is that property management is generally considered to be more all encompassing: for example, management of an entire property as opposed to just the building. In addition, property managers are commonly responsible for more than one building on a particular piece of property.[9] A property manager usually reports to an asset manager or a divisional manager, who works on behalf of the building's owner.

The roles and responsibilities of building managers vary greatly. Building managers are given the authority to act on behalf of the asset manager, the property manager or the owner. It should be noted that a building manager's job description is typically quite broad. In some circumstances, the building manager might also perform some or all of the functions of asset and property managers. Although the job descriptions vary from building to building and company to company, the following are understood,

within the context of this research, to be the main duties and functions of a typical residential building manager:[10]

- Creating and implementing yearly budgets.
- Hiring and supervising personnel.
- Hiring and supervising contractors and consultants.
- Developing management and marketing plans.
- Coordinating opening activities.
- Financial reporting
- Accounts payable.
- Lease administration.
- Customer service.
- Computerization.
- Implementing fire and life safety programs.
- Ensuring adequate provision of security.
- Risk management.
- Physical status reports.
- Tenant retention.
- Tenant improvements.
- Marketing and leasing.
- Policy and procedure updates.
- Coordinating general and preventive maintenance programs.

For further detail regarding daily building management activities, refer to the Master Operational Checklist in Appendix A.

2.3.4 Superintendents, Rental Managers and Other Staff

In a typical MURB operated by a property management company, a live-in superintendent or superintendent couple may take care of day-to-day building maintenance. Some buildings may also have a rental manager. A host of other personnel, such as secretaries, receptionists or concierges, may also be present in larger buildings, as indicated in Figure 1 on page 8.

2.3.5 Contractors and Consultants

While in-house employees provide some maintenance services, plumbing, electrical, mechanical work, and landscaping are often contracted out to other companies. These services are an essential component in building management. The property management firm specifies the nature, scope, and description of the work to be done. Following this, a formal agreement is usually made describing the terms of the contract.

2.3.6 Tenants

A tenant or lessee is a person who has obtained the right to temporary use of a house or apartment owned by another person or body: the owner, or landlord. A lease may be used to spell out the duration and terms of the lessee's tenancy. Tenants, as well as landlords, are subject to provincial and municipal regulations, and to terms stipulated by a leasing agreement. Other than through the enforcement of landlord-tenant laws and terms of a lease, the behavior of tenants cannot be controlled, but can be influenced. This means that tenants will have an indirect, yet key role to play in the operation and ultimate success of an Environmental Management System.

In the case of condominiums, tenants are actually owners. In co-operatives, tenants do not own their individual units, but they own shares in the co-operative.

2.3.7 Corporate Organizational Structure

The organizational chart in Figure 1 illustrates the typical relationship between the key players in residential building management, along with some of the other personnel to whom responsibility may be delegated.11 The owners and/or decision-makers, the various levels of management, and their relationship to the tenants vary with each category of building management: profit, non-profit, condominium or co-operative. In smaller buildings, there may be fewer levels of management than are indicated on the chart. In some building management arrangements, such as co-operatives, there may also be tenant committees who make recommendations to the board of directors on various issues.

It may be helpful to define a chart like this for a specific MURB when designing an Environmental Management System (EMS), to help identify the responsibilities of personnel and the roles they can play in implementing the system.

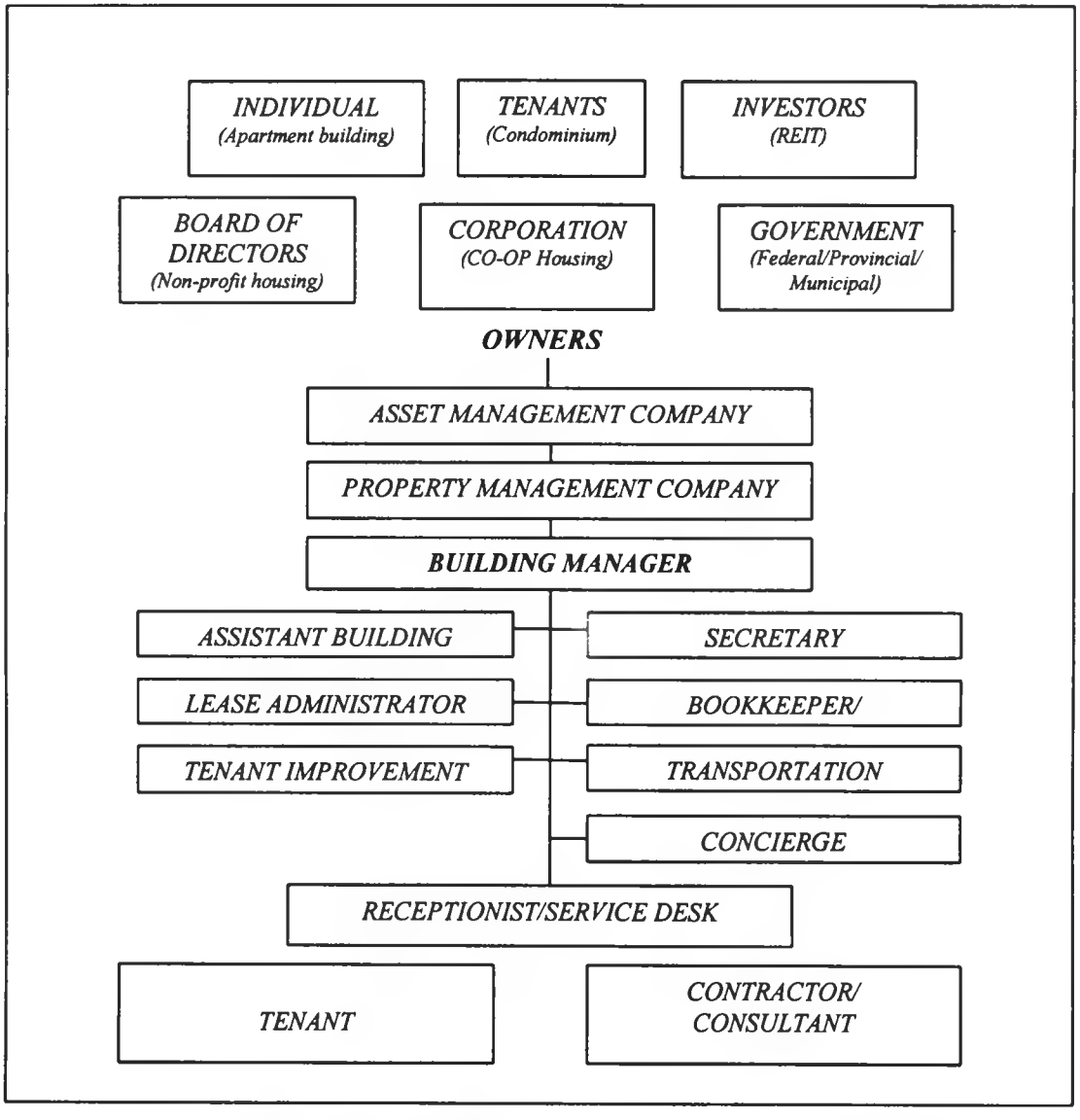


Figure 1: Typical Organizational Structure of Key Players in Property Management

2.4 Residential Building Management Resources

2.4.1 Industry Associations

An *association* represents a body of persons or companies who have organized for a common purpose. Companies or individuals may join an association if they meet certain qualifications, follow the rules and regulations set forth by the association, and pay a membership fee. Besides having the support of a recognized association, benefits of membership may include:

- Enhancement of public image;
- Management advice/consultation;
- Education;
- Legal services;
- Help in tendering contracts;
- Information and training;
- Financial support;
- Insurance services;
- Promotion of members' services; and
- Assistance in lobbying for government support/funding.

A few of the associations representing groups within the building management industry in Canada are:

Association of Condominium Managers of Ontario
The Association of Condominium Managers of Ontario (ACMO) is a professional association representing approximately 300 condominium managers across Ontario. Its mission is to "enhance the quality performance of condominium property mangers and management companies in Ontario."[12] ACMO publishes a quarterly magazine and newsletter, and offers courses in condominium management. The association also administers its own certification designation of R.C.M. (Registered Condominium Manager) and offers self-policing of its members through a Code of Ethics.[13]

Canadian Condominium Institute
The Canadian Condominium Institute (CCI) is a national association representing all facets of the Canadian condominium community. Its mandate is to act as a "central clearinghouse and research centre on condominium issues and activities across the country" and to "assist its members in establishing and operating successful condominium corporations through education, information dissemination, workshops and technical assistance."[14] CCI operates through local chapters across the country.

Ontario Non-Profit Housing Association
The Ontario Non-Profit Housing Association (ONPHA) is the "official voice of non-profit housing in Ontario."[15] ONPHA supports its members through newsletters, regional meetings, courses and workshops, an annual conference, publications, and management advice. ONPHA also works with municipal, provincial and federal governments to "ensure that non-profit housing continues to be a quality, cost-effective solution to local housing needs."[16]

Building Owners and Managers Association (BOMA)
The mission of BOMA is to "advance the common interest of Building Owners and Managers, Industry Allies, and Students pursuing a career in the industry beyond the year 2000 by providing relevant and valued services, education and awareness." [17] BOMA strongly promotes the education and certification for all its members, through programs available through the Building Owners and Managers Institute (BOMI). Courses offered through BOMI range from building design and maintenance to environmental health and safety issues. The Institute requires all of its members to adhere to the BOMI Code of

Professional Ethics and Conduct. This code outlines members' responsibilities and commitment to legal compliance and continuing education.

The Co-operative Housing Federation of Canada (CHF Canada)
The Co-operative Housing Federation of Canada (CHF Canada) was founded in 1968 with the goal of uniting, representing and serving housing co-operatives and member organizations across Canada. As a member of the worldwide co-operative movement, CHF Canada promotes the practice of co-operation in Canada and abroad. CHF Canada writes and publishes educational material for housing co-ops. It also offers instructor training programs, workshops, and an annual member education forum. Regional and local co-operative federations also exist.

The National Association of Residential Property Managers (NARPM)
Founded in October 1988, The National Association of Residential Property Managers (NARPM) is a U.S. based trade organization for the residential property management industry. Although it is an American association, NARPM is open to Canadian membership. The association promotes professional education and offers its members certification in the standards and practices of the residential property management industry. Internal and external communication is established through newsletters and an Internet Web Site. The association hosts annual conventions, workshops and courses. A code of ethics and professionalism guidelines developed by the NARPM outline the responsibilities and duties of property managers to the public, the tenants and the clients. The code also educates new and existing members on professional business practice.[18]

2.4.2 Reference Documents

The following reference documents are a just a few of the sources of information available to the residential building management industry:

Ontario Rental Housing Tribunal, Interpretation of Guidelines – Breach of Maintenance Obligations and The Tenant Protection Act, Queen's Printer for Ontario, 1999.
These guidelines are complementary to the Tenant Protection Act as they further explain the responsibilities and duties of tenants and landlords as set by the Provincial Government of Ontario.

Shear, Mel A., ***Handbook of Building Maintenance Management***, Prentice-Hall Inc.
This book breaks down all the building components and systems into appropriate services (housekeeping, groundskeeping, electrical services, etc.), and explains each service in detail. The book provides an explanation of the fundamentals behind each service, and how different components of the service should be repaired or maintained.

Shear, Mel A., ***Property Management Reinvented: How to Convert Maintenance and Energy Expenses to Profits***. Prentice-Hall Inc.
This book outlines the most cost-effective methods of operating a multi-residential apartment building or condominium. It goes into great detail about budgeting, human resource management, contracting, energy management, and other aspects of property management.

Apartment & Condominium Operator's Manual, Resident Managers' Training Institute (RMTI).
This manual, available only to those who enroll in the RMTI Certified Resident Manager Course, provides an overview of the entire operation of an apartment building, from leasing and tenant relations to step-by-step instructions for routine maintenance and repairs.

The Resident Manager: On-Site Management Handbook for Apartments and Condominiums, The Institute of Real Estate Management.
Although somewhat dated, this book gives excellent background as to the role of the on-site Superintendent. It also has an extensive List of Forms that can be used in the day to day operation of a building.

Manual 1: An Operating Manual for Owners and Managers. Efficiency Engineering Inc., Canadian Mortgage and Housing Corporation.
This manual, which has not yet been published, will provide owners and managers with the tools to "tailor a cost-effective and successful management system for any multi-residential building."[19]
The book explains the process of creating an Operation and Energy Management Plan: " a set of documents to guide staffing, manpower planning, task planning, contracting tenant management, budgeting, fire and life safety essentials, and utility management."[20] The manual will also help building owners and managers to make human resource decisions concerning on-site staff and outside contractors and to create an organized filing system. An appendix of the manual is a Master Operational Check List, or a Preventative Maintenance Schedule, included in Appendix A of this report.

Maintenance Planning Handbook, Ontario Non-Profit Housing Association.
The *Maintenance Planning Handbook* provides guidance for non-profit housing groups. Each section is broken down into subsections; for example, in *Maintenance Schedules* there is a subsection on mold. A series of appendices includes a sample contract, preventive maintenance schedule, inspection form, work order form, and other helpful documents.

The ONPHA Handbook: A Practical Guide for Directors and Managers of Non-Profit Housing. Ontario Non-profit housing Association.
This is a basic guide to non-profit housing management, and includes information on the role of the Board of Directors, the non-profit group's legal responsibilities, hiring a property manager or staff, building maintenance, financial management, and how to work with tenants.

The ONPHA Tenant Participation Handbook. Ontario Non-profit housing Association.
This book, designed for tenants, board members, staff and consultants, suggests ways of achieving tenant participation in non-profit housing.

The ONPHA Maintenance Planning Handbook. Ontario Non-profit housing Association.
The ONPHA Maintenance Planning Handbook presents information in book or electronic file format to help develop a streamlined maintenance administration system. It provides insight into such issues as organizational structure, administration, legal requirements and liability issues, preventive and corrective maintenance, life safety and security systems. This publication includes sample forms, checklists, legislated maintenance requirements and tips on key control, contracting out, and dealing with tenants on maintenance issues.

The ACMO Professional Code of Ethics, Association of Condominium Owners of Ontario.
This volume is a combination of the organization's Code of Ethics, regulations and bylaws, and manuals from courses offered through the association describe the practices and systems that have been developed over the past twenty years. While the Code of Ethics provides an outline of the responsibilities and duties of the condominium manager, the regulations and bylaws are extremely detailed procedural manuals.

Baker, Mark G., LL.M., ***Condominium Law in Ontario: A Practical Guide.*** Canada Law Book, 1999.
Condominium Law in Ontario is a reference guide for lawyers, condominium owners and board members. It includes information on the purchase and registration of condominiums, commercial condominiums, mixed use condominiums, deficiency actions, directors' responsibilities new developments in condominium and co-operative conversions, and co-operatives and co-tenancies.[21]

CAN/CSA-ISO 14004:1996, Environmental Management Systems – General Guidelines on Principles, Systems and Supporting Techniques. CSA International, 1996.
This document provides guidance for organizations wishing to establish or improve an environmental management system. Examples, descriptions and options, as well as practical advice, are included to aid in both the implementation or enhancement of an environmental management system, and in strengthening its integration into the overall management of the organization. ISO 14004 is intended for use by all types and sizes of organizations in all countries. [22] Note: this is a guide only, and does not contain the requirements that may be objectively audited for certification/registration purposes or for self-declaration purposes.

PLUS 14000 - The ISO 14000 Essentials: A Practical Guide to Implementing the ISO 14000 Standards. CSA International, 1996.
This document is intended to be a comprehensive and user-friendly guide for understanding and implementing the requirements of CAN/CSA-1SO 14001, Environmental Management Systems: Specifications with Guidance for Use.

Co-Operative Housing, 2nd revised edition. International Co-operative Alliance, 1987.
This is a handbook on how to form new housing co-operatives in different parts of the world. Economic, technical, management and administrative aspects of housing co-operatives are analyzed. Also available in French and Spanish. [23]

This is a non-exhaustive list of publications. Many more resources are available through industry associations and their educational programs.

2.4.3 Software Packages

The introduction of the personal computer into the workplace has led to significant changes in the property management industry. Property management computer software packages offer standardized, efficient methods for maintaining financial, personal, and maintenance records. In addition, the efficiency of a property manager may be increased as more properties are managed with fewer staff members. Besides handling all the financial aspects of property management, some software is able to track energy and water consumption, allowing annual comparisons to be easily made. These components could become valuable tools in the implementation of an Environmental Management System.

The following are a few of the currently available software packages offered to the residential building management industry:

Spectra
Spectra Computer Services Inc. is a Canadian company specializing in Property Management Software. *Spectra for Windows* is an accounting and record-keeping program designed to keep track of tenant, owner, and building information. The software also includes optional maintenance management and energy tracking components. The maintenance component generates work and purchase order forms and stores the information for future reference. It can also be used to generate a preventative maintenance schedule to inform the user when to check the mechanical system, when to replace light bulbs and . The energy-tracking module tracks and reports on energy consumption by dollar or unit measurement. [24]

DataTrust Software
DataTrust Incorporated is a California company that offers software for the real estate management industry. Packages for homeowner and condominium association management, as well as apartment, office and commercial management are available. The software is Internet compatible, and will run on a

variety of operating systems. DataTrust software helps manage financial records and information about tenants and suppliers.[25]

FOCUS 2000
Trow Consulting Engineers Ltd. of Brampton, Ontario, specialize in all areas of environmental consulting engineering. Trow's FOCUS 2000 software for facility management was created to help analyze physical property assessments, plan for the future of a facility, and provide direction in the management and conservation of properties. [26]

Tabware
Tabware Asset Management Software by the Fluor Corporation is a computerized maintenance management system/enterprise management system designed to help manage facilities throughout their lifecycles. Tabware integrates many maintenance practices, and offers a variety of modules to suit the needs of individual facilities. Modules are available to keep track of equipment, events (including accidents, emissions, inspections, corrective actions, audits and work orders), scheduling, preventive maintenance, resources, inventory, requisitioning, purchasing, invoices, and suppliers. Tabware also offers security and setup modules and graphic analysis capabilities. It is capable of integration with many types of computer files, ranging from AutoCad and Intergraph drawings to spreadsheets, word processing documents and graphics. [27]

Angus Maintenance Management System
This computerized maintenance management system provides a means of keeping track of maintenance procedures, both scheduled and unscheduled, tenant requests, inventory control, human resources and work orders. [28]

Idea to Action Software by J.D. Edwards
J.D. Edwards manufactures software for a variety of business applications. Idea to Action software for property managers, real estate investment trusts, developers, commercial realtors and facility management organizations combines accounting and budgeting software with a variety of other applications geared specifically for property management including, among others, tracking tenant improvement costs, equipment plant maintenance, inventory, work orders and service billing.[29]

2.5 Environmental Issues Affecting Building Management

2.5.1. Environmental Impacts

The environmental issues surrounding the building management industry are complex and extensive. On-going research and development constantly reveal new findings about the environmental impacts of the construction and building management industries. The level of risk of each must be determined on an individual basis, since it may vary depending on the situation. Some impacts are immediate and high risk. Others are less serious in the short term, but may lead to serious long-term problems. The following are considered to be major environmental impacts of building management activities:[30]

- Hazardous waste generation: this includes both newly generated waste as well as toxic substances associated with renovation: for example, asbestos containing materials and PCBs from old light ballasts and electrical transformers;
- Natural resource consumption;
- Energy consumption;
- Water consumption;
- Non-hazardous waste generation;
- Greenhouse gas and ozone depleting substance emission (atmospheric emission);
- Liquid effluents;

- Poor indoor air quality;
- Underground and above ground fuel storage tanks;
- Site contamination (for example, from heating oil spills); and
- Emergency generators.

Building management guidelines exist for federal government buildings. Although commercial and residential buildings are not currently regulated, Canada Mortgage and Housing Corporation (CMHC) and other lending institutions are increasingly requiring demonstration of a property's compliance with standards for financial and insurance purposes.

The built environment in Canada exerts a profound effect on the natural environment. The construction industry is a significant part of the Canadian economy, representing between 10% to 14% of the Gross Domestic Product (GDP) and consuming approximately 40% of the country's annual resource expenditure.[31] Indirectly, the industry represents a larger percentage of the country's GDP as a result of sister industries such as resource extraction, transportation, and energy provision.

According to the Worldwatch Institute, buildings in the United States use 17% of the total fresh water flows and 25% of harvested wood; they are responsible for 50% of Chlorofluorocarbon (CFC) production; use 40% of the total energy flows; generate 33% of Carbon Dioxide (CO_2) emissions; and generate 40% of landfill material from construction waste.[32]

William Rees and Mathis Wackernagel have developed a simple indicator of human stress on the environment, called the Ecological Footprint. It is an accounting tool that converts requirements for food, transport, housing, consumer goods and other services into a land-area equivalent. Based on this tool, it has been calculated that the average Canadian requires about 4.8 hectares of ecologically productive land to sustain his/her current level of consumption. It has also been calculated that 1.92 hectares of productive land per person are used to support building structures.[33]

Clearly, a systematic approach to reducing environmental impacts from building operation activities would be beneficial.

Figure 2: The Ecological Footprint

Examples of Environmental Aspects of Buildings

The following three examples illustrate environmental issues in the context of residential buildings.

1. Indoor air quality

Indoor air quality (IAQ) is an important element of indoor ecology. "Indoor pollutants accumulate from four sources: outside air, building materials, mechanical equipment, and people. Common sources include Volatile Organic Compounds (VOCs), biological contaminants, ozone, carbon monoxide, asbestos, and tobacco smoke."[34] Formaldehyde, a VOC, can be found in some grades of plywood, particle board, carpets, draperies and upholstery. Urea-formaldehyde foam insulation, which has been banned since 1980, was a significant source of formaldehyde, and may still present a problem in some older buildings. Depending on the degree of concentration, formaldehyde can trigger anything from eye irritations to asthma attacks.

Exposure can result in headaches, dizziness, nausea, and breathing difficulties, as well as skin, nose, and throat irritation. Formaldehyde may cause nosebleeds and is suspected to be carcinogenic. While the toxicity of materials is a prime source of the problem, humidity and climate can also enhance emissions and promote the growth of bacteria and fungi. Proper equipment maintenance and management of indoor temperature and humidity help solve the problem.[35]

2. Water Consumption

Although the earth is roughly 70% water, only about 3% of this is fresh water. In addition, two-thirds of the fresh water on the planet is relatively inaccessible, since it is frozen in polar ice caps. As potable water is vital to human survival, the available quantity of drinking water is becoming an important environmental issue.

The water supplied to all household fixtures is typically of drinking quality, even though only half of domestic uses require potable water. According to Environment Canada, in 1996, average Canadian domestic water consumption was approximately 326 litres per person per day with toilet usage being responsible for consuming approximately 30% of the total household supply. The installation of water-saving features, such as new low-flush toilets, faucet aerators, efficient showerheads, and efficient appliances are easy, inexpensive, provide immediate cost savings, and can reduce the amount of water used by over 30%.[36]

3. Molds

Molds are fungal micro-organisms that "digest" materials to obtain the nutrients they need to survive. Molds require a damp substrate upon which they can release a solution containing enzymes. This solution dissolves the substrate into a consistency the molds are able to digest. Molds can grow in almost any damp spot, and often go undetected in non-visible parts of buildings and basements that are less exposed to the drying effects of moving air or heat. The human health risks associated with molds are serious. Exposure to high concentrations of mold can result in:

Hypersensitivity pneumonitis: A severe allergic reaction occurring within lung tissue. Symptoms can include shortness of breath, lowered oxygen in the blood, and accumulation of fluids within lung cavities. Overtime, exposure can lead to scarring of lung tissue, at this point the damage is irreversible;[37]

Organ Dust Toxic Syndrome (ODTS): Symptoms can include burning in the eye and throat regions, headaches, cough and flu-like symptoms;[38] and

Stachybotryotoxicosis: Symptoms include pain and inflammation in mouth and throat membranes, tightness in chest, fever, headaches and fatigue. Stachybotryotoxicosis has been suspected of being a contributing factor to hemmoraging in young children.[39]

Improperly protected workers and occupants can become extremely ill if appropriate abatement measures are not observed.

2.5.2 Environmental Aspects of Building Components

Table 1 presents a non-exhaustive summary of the major building components and systems that may be found in multi-unit residential buildings, with a discussion of the environmental aspects of each component. The chart also summarizes which participant in the building management system can influence each environmental aspect. It should be noted that this chart focuses on the ongoing operation of existing buildings, and does not include the influence of designers or builders who may limit or enhance potential performance before it is occupied. The extent of environmental impact of each building and building component will vary greatly, depending on occupant density. For more information on

environmental aspects, refer to CSA International's *PLUS 1145 - A Guide to Identifying Significant Environmental Aspects.*

Table 1: Environmental Aspects of Building Components and Systems

Building Component or System	Environmental Aspects	Participants Who Influence Environmental Aspects
Building Envelope	➢ Renovation and maintenance will result in solid waste generation and increased natural resource use from building material procurement. ➢ Increased energy consumption will result from a poorly insulated building due to excessive heat loss or gain. Thermal bridging in the building envelope also results in excessive heat loss. ➢ Increased energy consumption can result if building windows, doors and fixtures are leaky or poorly insulated. ➢ Leaky or non-existent air barrier systems can result in excess heat loss and condensation problems. ➢ Water infiltration may lead to damage to the building, requiring more energy and material to repair the building. ➢ Moisture problems can also lead to mold growth, and have an adverse effect on indoor air quality.	➢ Building managers ➢ Caretakers ➢ Other maintenance contractors or personnel
Building Interiors	➢ Renovation and maintenance will result in solid waste generation and increased natural resource use. ➢ Interior finishes may contribute to indoor air pollution due to off-gassing of products. ➢ Poorly maintained interiors may contribute to health problems if proper abatement measures are not observed (i.e. Mold growth).	➢ Building managers, caretakers, contractors and other maintenance personnel are directly responsible; however, ➢ Building staff and tenants can be instrumental in making managers or maintenance personnel aware of problems and deficiencies.
Vestibule	➢ Energy consumption due to heat loss through vestibule entrance.	➢ Building management and staff ➢ Maintenance personnel or contractors ➢ Concierge ➢ Tenants
Security Booth	➢ Energy consumption due to use of security cameras, televisions, etc.	➢ Building manager ➢ Security system contractor

Table 1: Environmental Aspects of Building Components and Systems		
Building Component or System	**Environmental Aspects**	**Participants Who Influence Environmental Aspects**
Circulation space: Stairs, corridors.	➢ Renovation and maintenance will result in solid waste generation and increased natural resource use. ➢ Interior finishes may contribute to indoor air pollution due to off-gassing of products. ➢ Poorly maintained interiors may contribute to health problems if proper abatement measures are not observed (i.e. Mold growth). ➢ Increased energy consumption can result if light fixtures are inefficient.	➢ Building managers ➢ Caretakers ➢ Renovation Contractors
Administrative Offices; Front Desk /Reception	➢ Paper waste generation, ➢ Resource consumption to produce office furniture, ➢ Energy use resulting from office computers, fax machines, etc.	➢ Building manager and staff
Lounge/Common Rooms	➢ Generation of solid waste, ➢ Energy consumption from use of recreational appliances (television, radio, stereo).	➢ Building manager ➢ Tenants ➢ Maintenance staff
Public Washrooms	➢ Water consumption and waste water generation due to facility use, ➢ Paper consumption and waste, ➢ Electrical consumption from hand dryers, ➢ Use of cleaning chemicals.	➢ Building managers ➢ Mechanical maintenance personnel ➢ Staff and tenants who may use the washrooms regularly

Table 1: Environmental Aspects of Building Components and Systems

Building Component or System	Environmental Aspects	Participants Who Influence Environmental Aspects
Residential/Tenant Living Areas	➢ Possible indoor air pollution due to renovation activities (cutting of drywall, etc). ➢ Possible indoor air pollution due to off gassing from paints, solvents, chemicals and new materials. ➢ Excessive energy and water consumption may occur if inefficient facilities are selected during design/ renovation/ replacement projects. ➢ Poor seals around doors, windows, and electrical outlets will result in increased energy consumption due to heat/cold air loss. ➢ Kitchens and bathrooms may have poor indoor air quality due to the growth of molds in moist areas. Venting to correct moisture problems may result in heat loss. ➢ Possible indoor air pollution due to off gassing from cleaners, chemicals and pesticides and tenants who smoke. ➢ Solid waste generation, particularly from kitchens. ➢ Generation of carbon dioxide from respiration. ➢ Dust and dander from pets may cause allergic reactions in some tenants.	➢ Building managers, caretakers, contractors and other maintenance personnel are directly responsible for maintenance and renovation activities; however: ➢ Tenants affect the amount of wear and tear on a building, and the amount of maintenance required. ➢ Tenants can be instrumental in building staff aware of problems and deficiencies. ➢ Tenants are responsible for selecting and using cleaners, and other chemicals involved in their day-to-day use of the space.
Staff Locker Room	➢ Water consumption (if showers are provided). ➢ Moist air may need to be vented to prevent the growth of mold.	➢ Building manager and staff ➢ Mechanical maintenance staff or contractor
Staff Kitchen	➢ Energy consumption from cooking appliances and lights. ➢ Generation of solid waste, especially organic waste. ➢ Growth of mold in damp areas, especially if inadequately ventilated.	➢ Building manager and staff ➢ Mechanical maintenance staff or contractor

Table 1: Environmental Aspects of Building Components and Systems		
Building Component or System	**Environmental Aspects**	**Participants Who Influence Environmental Aspects**
Laundry Rooms	➢ Energy consumption: high cooling loads result from excessive heat gain from dryers in summer. ➢ Water consumption, generation of large amounts of wastewater ➢ Water pollution due to use harsh cleaners, bleaches, etc. ➢ Cleaners can off-gas and affect sensitive tenants ➢ Indoor air pollution caused by dust from dryers; mold growth due to moist conditions if room is not properly ventilated.	➢ Building managers ➢ Maintenance personnel or contractors ➢ Tenants and staff who use the laundry facility.
Storage Shed/Space	➢ Herbicide, pesticide storage and disposal. ➢ Fuel storage may contribute to air pollution due to evaporation of volatile components. ➢ Fuel storage may contribute to indoor air pollution if storage shed is located next to or attached to main building. ➢ Garden and snow removal machinery consumes energy and may generate greenhouse gases and other air pollutants.	➢ Building manager ➢ Staff or contractors who store materials and have access to shed ➢ Fuel companies
Workshop	➢ May contribute to indoor air pollution if work releases particulate matter/dust during cutting. ➢ Energy consumption from use of power tools. ➢ Possible air pollution due to storage of hazardous/volatile solvents and chemicals.	➢ Building manager ➢ Maintenance personnel who use the workshop
Janitorial Storage	➢ Storage of cleaning materials which may release volatile compounds into air. ➢ Disposal of expired cleansers and solvents. ➢ Use of water for cleaning procedures.	➢ Caretaker or Janitor
Hazardous and Flammable Materials Storage	➢ Storage of Hazardous materials (i.e. solvents, hydrocarbons, etc) can contribute to air pollution from off-gassing of volatile compounds. ➢ Ventilation air from storage area may need to be treated before being released to environment.	➢ Building managers ➢ Caretakers or other maintenance personnel responsible for the use and storage of the materials.

Table 1: Environmental Aspects of Building Components and Systems		
Building Component or System	**Environmental Aspects**	**Participants Who Influence Environmental Aspects**
Attic Space	➢ High levels of heat loss resulting in unnecessarily high levels of energy consumption if attic is not properly insulated. ➢ Inadequate ventilation of an attic space may lead to excessive moisture, which can make insulation ineffective ➢ Moisture may encourage mold growth, leading to poor indoor air quality.	➢ Building manager ➢ Caretakers ➢ Mechanical maintenance personnel or contractors
Crawl Spaces	➢ High levels of heat loss resulting in unnecessarily high levels of energy consumption if crawl space is not properly insulated. ➢ Indoor air quality problems may be aggravated by molds growing in crawl spaces without adequate ventilation. ➢ Radon gas contamination of indoor air from the ground may be an issue in some localities.	➢ Building managers ➢ Caretakers or other maintenance personnel
Garage and Parking Spaces	➢ Paving of green spaces results in increased water run-off directed to storm sewers. ➢ Idling of automobiles in garage can contribute to indoor air pollution problems if not well ventilated. ➢ Exhaust from automobiles contributes to air pollution and green house gas emission. ➢ Hydrocarbon fluids leaking from parked automobiles contaminate storm sewer water during run off events caused by rainfall events. ➢ Salting of parking areas may contribute to excessively high levels of salt in the local watershed. ➢ Salt can also lead to premature degradation of parking structures. ➢ Rehabilitation of damaged structures requires more materials and energy.	➢ Building managers ➢ Mechanical maintenance staff or contractor ➢ Tenants

Table 1: Environmental Aspects of Building Components and Systems		
Building Component or System	**Environmental Aspects**	**Participants Who Influence Environmental Aspects**
Balconies	➢ Balconies may contribute to excessive heat loss due to thermal bridging through structural members that penetrate the building envelope. ➢ Glazed doors to balconies may also contribute to excessive heat loss/gain.	➢ It is difficult to influence problems associated with structural design at the maintenance stage ➢ Tenants and maintenance personnel may be able to control heat loss or gain through doors by ensuring that seals and weatherstripping are in good repair weather, and by providing and using insulating shades or blinds.
Roof-top Terrace, Public Gardens, courtyards, patios	➢ Herbicide and pesticide use on landscaped areas may contribute to indoor and outdoor air pollution. ➢ Usage of chemicals will also result in contaminated runoff being directed to sewers through catch basins and roof drains. ➢ The paving of green spaces increases run-off waters to storm sewers. ➢ Landscaped areas, particularly roof decks, may have a beneficial impact on the environment by supporting oxygen-producing plant life and by diverting high levels of storm water runoff from sewers. ➢ Rooftop gardens require stronger supporting structures; however they add to the life expectancy of the roof. ➢ Excessive waste may be generated if yard waste is not diverted to a composting program. ➢ A composting program incorporated into building landscaping provides a method for disposing of organic household waste for tenants. ➢ Rain water may be collected for use in an irrigation system.	➢ Building manager ➢ Gardener or landscape contractor

Table 1: Environmental Aspects of Building Components and Systems

Building Component or System	Environmental Aspects	Participants Who Influence Environmental Aspects
Recreation Components: ➢ Swimming pool and Jacuzzi ➢ Squash/ Tennis/ Racketball/ Volleyball/ Basketball Courts ➢ Jogging track ➢ Exercise/weight room ➢ Locker/change room ➢ Sauna	➢ Use of chemicals to treat water in pool and jacuzzi. ➢ Water and energy consumption to heat and fill pool and jacuzzi, also showers, if installed. ➢ Water use from washroom facilities. ➢ Paving for courts and tracks will increase water run off to storm sewers. ➢ Energy consumption to heat sauna.	➢ Building managers ➢ Maintenance personnel or contractors ➢ Tenants and staff who use the recreation facilities.
Commercial Components: ➢ Restaurants/Bars ➢ Retail Spaces ➢ Office Spaces ➢ Conference Rooms ➢ Ballrooms/Reception Halls ➢ Community Tenant Association Offices	➢ Solid waste generation due to occupancy. ➢ Organic waste generation from restaurant and bar activities. ➢ Water and energy consumption due to use of facilities, appliances, lighting, computers, etc. ➢ Paper generation from office space use. ➢ Indoor air pollution from smoking facilities, if not properly ventilated.	➢ Building managers. ➢ Building maintenance personnel and contractors. ➢ Managers and staff of commercial establishments. ➢ Tenant Associations ➢ General public

Table 1: Environmental Aspects of Building Components and Systems		
Building Component or System	**Environmental Aspects**	**Participants Who Influence Environmental Aspects**
Mechanical System, including : ➢ Natural gas, propane and oil systems ➢ Boiler Room ➢ Mechanical Room ➢ Heating and cooling equipment	➢ Energy consumption may be unnecessarily high if equipment is not well maintained. ➢ Excessive energy consumption can occur if tenant utilities are included in rental cost. ➢ Generation of greenhouse gases and other airborne pollutants. ➢ Use of ozone-depleting substances in cooling systems and fire suppression systems. ➢ Combustion equipment may contribute to indoor air pollution if not properly balanced with ventilation system. ➢ Fuel storage may contribute to air pollution due to evaporation of volatile components. Spill containment strategies are necessary ➢ Chemical associated with maintenance of mechanical system: water treatment chemicals, lubricants, etc. ➢ Solid waste generation from supply packaging, used filters, etc.	➢ Building manager ➢ Mechanical maintenance staff or contractor ➢ Tenants affect the heating and cooling load by adjusting thermostats, leaving windows and doors open, and using or not using insulating blinds or drapes.
Ventilation System	➢ Energy consumption, excessive heat loss if a heat recovery system is not used. ➢ Well-maintained systems may make a positive contribution to indoor air quality ➢ Poorly maintained systems may contribute to the spread of dust and molds ➢ Ventilation systems should be adjusted during renovation to prevent the spread of dust.	➢ Building managers, ➢ Caretakers ➢ Contractors ➢ Other maintenance personnel

Table 1: Environmental Aspects of Building Components and Systems

Building Component or System	Environmental Aspects	Participants Who Influence Environmental Aspects
Electrical System, including: Electrical Room Wiring Light Fixtures Electrical Appliances	➢ Energy consumption: amount depends on efficiency of equipment and number of fixtures, and the habits of tenants ➢ Excessive energy consumption can occur if tenant utilities are included in rental cost. Use of energy efficient lightbulbs, appliances, etc should be encouraged when tenants have the choice. ➢ Wiring that has not been done properly or has not been well maintained may lead to fires, which cause air pollution. ➢ Possibility of hazardous materials such as PCBs in transformers in older buildings. ➢ Generation of electromagnetic fields in areas of high voltage.	➢ Building manager ➢ Electrical maintenance staff or contractor ➢ Tenants
Plumbing System	➢ The amount of water consumption depends on the number and efficiency of plumbing fixtures, and how well they are maintained. ➢ Increased water consumption will result if appliances and household items (toilet, shower, faucet) are inefficient and in poor repair (i.e. leaky). ➢ Excessive water consumption can occur if water and sewer services are included in rental cost. ➢ Water conservation methods should be presented to tenants and encouraged. ➢ Old water pipes may lead to reduced water quality. ➢ Uninsulated hot water tanks and pipes allow excessive heat loss from water and result in higher fuel consumption. ➢ Hazardous substances, such as asbestos, may be present in pipe insulation.	➢ Building manager ➢ Plumbing maintenance staff or contractor ➢ Tenants: in terms of both personal habits, and informing building staff when maintenance of plumbing fixtures is required.

Table 1: Environmental Aspects of Building Components and Systems

Building Component or System	Environmental Aspects	Participants Who Influence Environmental Aspects
Health and Safety Systems: Fire Alarms Sprinkler Systems	➢ Fire alarms systems help prevent air pollution caused by fires ➢ Ionizing smoke detectors generate a very small amount of radioactivity into the indoor space. ➢ Ozone-depleting substances in the form of halons may be present in older fire suppression systems.	➢ Building manager ➢ Fire alarm installer and monitoring contractor ➢ Tenants are responsible for making sure smoke detectors have functioning batteries.
Communication Systems: Telephone Rooms	➢ Possibility of excess heat loss point where conduit for telephone wiring penetrates exterior wall.	➢ Building manager ➢ Maintenance personnel or contractors
Conveying Systems: Service and Passenger Elevators, Elevator Machine Room.	➢ Energy consumption, chemicals associated with elevator mechanics and maintenance. ➢ Spill containment procedures for chemical spills are necessary. ➢ Hazardous materials.	➢ Building manager ➢ Elevator maintenance contractor ➢ Tenants and staff who use the elevators
Waste Management Systems: Garbage Depot Recycling and composting bins	➢ Generation of unrecyclable waste if bins are not protected from contamination measures. ➢ Odour generation if bins are not emptied regularly. ➢ Fire hazard, if protective measures are not taken: fires in garbage areas generate air pollution. ➢ Renovation waste. ➢ Waste diversion programs that promote recycling or re-use of materials may provide a positive solution to solid waste production.	Building management and staff Building maintenance personnel Tenants: Waste generation may be excessive, and recycling bins can become contaminated if tenants do not cooperate in a waste management program.

Table 1 emphasizes the fact that virtually every component and system of a MURB has an environmental aspect. Although maintenance staff or contractors perform most of the day-to-day physical tasks that make a difference to the environmental performance of the building, they do so under the direction of the building manager; the building manager can both influence and control these issues. Tenant behaviour also affects the environmental performance of a building, but building managers can only influence, not control tenant behaviour.

2.5.3 Legislation and Regulations

There are many laws and regulations related to residential building management. Some laws are directly related to environmental issues. Other laws do not focus specifically on environmental issues, yet still have an impact on the environment.

Laws and regulations affect everybody involved in building management: owners, tenants, managers and those who work in and around the building. Owners, above all, must comply with applicable legislation or face penalties. In addition, owners are responsible for maintaining buildings to comply with various

codes: for example, the Fire Code. Failure to do so will result in fines and the issue of work orders for the building to be brought up to Fire Code standards. While the purpose of the Fire Code is to prevent fires and save lives, it also influences environmental impacts. Since the burning of a building will release toxic emissions into the atmosphere, any attempt to prevent fires is also a motion towards the prevention of pollution. This illustrates one of the side benefits of ISO 14001: the relationship between legislative compliance and the prevention of pollution.

Some laws such as the Pesticides Act, which regulates the application of toxic chemicals used for pest control, are directly linked to environmental issues. The Pesticides Act is related to prevention of water pollution, since run-off from sprayed lawns can trickle into water sources or storm sewers. The Pesticides Act can also influence indoor air quality when considering extermination practices within MURBs.

In Canada, new construction and major renovations are regulated by the National Building Code or, in some provinces, a provincial building code. The Building Code's main focus is on public safety and quality of construction, yet it still has an effect on environmental issues. For instance, while the Building Code does not always specify exactly what material to use, it does clearly influence material selection: for example, whether a building may be built of combustible or non-combustible materials, and the required fire resistance rating of each building assembly. By influencing material selection, the Code in turn influences the type and amount of natural resources that are extracted and the amount of energy that is required to process them into building materials and deliver them to the site. The Building Code also specifies minimum performance requirements for building components such as insulation, air barrier systems and ventilation systems. This has an effect on the energy consumption and indoor air quality of a building.

Tenants are protected by certain regulations having environmental significance. For example, The Ontario Tenant Protection Act (TPA) affects both tenants and landlords. Effective as of June 17, 1998, the TPA reforms six pieces of existing legislation:

- The Rent Control Act
- The Landlord and Tenant Act
- The Rental Housing Protection Act
- The Municipal Amendment Act,
- The Resident's Rights Act, and
- The Land Lease Statute Law Amendment Act."[40]

Article 24. 24. (1) of the Tenant Protection Act, 1997, Ontario regulation 198/98 states that "A landlord is responsible for providing and maintaining a residential complex, including the rental units in it, in a good state of repair and fit for habitation and for complying with health, safety, housing and maintenance standards."[41]

More specifically, the Tenant Protection Act requires that HVAC systems be maintained according to health and housing standards. A well-maintained HVAC system helps to achieve good indoor air quality within a building, providing a healthy environment for the tenants. Well-maintained equipment will also perform more efficiently, and reduce energy consumption.

Another clause from the Tenant Protection Act, Maintenance Standards O. Reg. 198/98 Section 39. (1) states that "interior cladding of walls and ceilings shall be maintained free from holes, leaks, deteriorating materials, mold, mildew and other fungi."[42]

While this clause deals with the general maintenance of an apartment, it also addresses the issue of mold, one of the most common indoor air quality problems in residential apartment units. As outlined in

Section 2.5.1, mold can be a serious health threat if it is not properly managed. Fines of up $50,000 can be meted out to owners who fail to provide adequate mold abatement measures.[43]

Lastly, environmental safeguards are in place for workers in order to guarantee occupational health and safety during maintenance, construction and renovation work. An example is the Ontario Occupational Health and Safety Act which, under Section 36.(1), specifies that an employer shall maintain an inventory of all hazardous materials and all hazardous physical agents that are present in the workplace. It also specifies under Section 25.(1) that when handling toxic material, such as mold, the employer shall provide protective equipment. In the context of the previous two examples, a property manager is bound to comply with legislation and regulations when abating a building for mold or using toxic cleaning agents.[44]

Some Ontario regulations/legislation that may have environmental significance in residential building management are:

- the Condominium Act,
- the Tenant Protection Act,
- the Pesticides Act,
- the Environmental Protection Act,
- the Energy Efficiency Act,
- Municipal by-laws and property standards,
- Zoning Laws,
- National and Provincial Building Codes,
- Fire Codes,
- the Occupational Health and Safety Act,
- the Noise Act, and
- the Weed Control Act.

Non-regulated guidelines produced by government bodies may also have environmental significance in residential building management, for example: water consumption reduction guidelines including information such as fixture flow rates, and appliance selection guides.

2.6 Environmental Performance Assessment of Buildings

Many parties with different competencies and interests have developed tools aimed at analyzing buildings with respect to their environmental properties and performance. Included among these are manufacturers, designers, developers, and researchers – all of whom have their own goals regarding "green" buildings. The tools used to reach these goals vary from simple checklists to systems involving complex criteria and weighting methods.

Today, many different building environmental assessment systems are available, usually by consulting agencies. In general, these systems are based on criteria systems, although the main structure varies. Variations among systems may include different numbers of criteria, different weighting systems, etc. As a result of these factors, results generated by using different products may also differ substantially. In light of this, it is not surprising that users often become confused. Clearly, a core methodology and system, supported by official bodies, is required.[45]

ISO 14001 compliance requires an organization to commit itself to the prevention of pollution and to the continual improvement of its environmental management system. By improving the system, it is expected that improvements to the environmental performance will inherently occur. In order to set reasonable goals for improvement, a building's environmental performance must first be assessed and recorded. Once the environmental management system has been designed and implemented, the assessment process

must be repeated periodically, and the results compared to determine whether there has been improvement. Corrective action is taken as deemed necessary.

The following section is a non-exhaustive survey of Building Environmental Performance Assessment Programs (BEPAs): it is a sampling of the most commonly used systems, and is included in this report to provide an overview of what BEPAs are and how they are used in industry. Survey results showed that although most residential property managers are aware of BEPAs, they are currently used most commonly in commercial building management.

2.6.1 The Building Research Establishment Environmental Assessment Method (BREEAM) [48]

Background

The *Building Research Establishment Environmental Assessment Method (BREEAM)* is currently the most widely used international method for assessing building environmental performance and quality in terms of energy, environmental impact, indoor air quality, operations, and management. By reporting the current achievements, red flagging areas of concern and identifying opportunities for improvement, *BREEAM* provides a first step in developing a realistic, proactive environmental management program for buildings.

BREEAM is updated on a regular basis to take advantage of new research, to reflect changing priorities in regulations and in the market place, and to build on experience. The aim is to ensure that *BREEAM* continues to represent current 'best practice' by going beyond what is required by regulations.

In 1996, *BREEAM* Canada was developed in collaboration with the Canadian Standards Association (now CSA International) and ECD Canada.

Method of Assessment

BREEAM is a tool that allows owners, users and designers of buildings to review and improve environmental performance throughout the life of a building. It is a widely accepted and respected system that sets a benchmark for environmental performance and provides a wide range of benefits.

BREEAM is independent and authoritative, being based on many years of construction and environmental research carried out at British Research Establishment (BRE) together with the input and experience of the construction and property industries, governments, and building regulators.

Rating System

The assessment process for existing buildings includes the use of a detailed questionnaire, a walk-through of the building, and a meeting with building management. The grading and rating system is done in two parts: Part 1 – Building Envelope and Systems, and Part 2 – Operation and Management. The reporting is also broken into two parts. A preliminary report indicates how well the building performs, credits good practice, red-flags concerns, and provides a list of practical strategies to improve the rating. Several months are given to allow management time to implement changes. These are then included in a final report along with a revised rating.

Criteria for Assessment

BREEAM assessments use three environmental scales: global, local, and indoor. Indoor issues include the building envelope and systems and, in the case of existing buildings, operation and management.

Global issues include:

- CO_2/Energy.
- Acid Rain.
- Ozone Depletion.

Recycling of Materials.

Local issues include:
- Water Conservation.
- Microbial Contamination.
- Transportation.

Indoor issues include:
- Lighting.
- Air Quality.
- Hazardous Materials.
- Radon.
- Indoor Noise.
- Microbial Contamination of Domestic Hot Water.

By basing criteria on commonly accepted best practice for local conditions, BREEAM goes beyond most regulatory requirements, but does not cover issues which have not achieved universal scientific agreement.

More information about BREEAM may be obtained from the web site of CSA International at *www.csa-international.org.*

2.6.2 Building Environmental Performance Assessment Criteria (BEPAC)[47]

Background
Developed at the School of Architecture, University of British Columbia, *Building Environmental Performance Assessment Criteria (BEPAC)* is a tool that may be used to gauge the environmental performance of office buildings above and beyond current legislative standards.

Method of Assessment
Points are awarded based on how well the building performs in five broad sections (with sub criteria). The performance assessment criteria are distinguished in the following four activities:

- Building design.
- Building management.
- Tenancy design.
- Tenancy management.

Rating System
For each criterion, a maximum of 10 points is awarded based on the building's environmental performance (10 points for zero impact – 0 points for current standard practice). Each criterion is weighted relative to other criteria of the same section for a total weight of 1.00. Each of the four activities, building design, building management, tenancy design, and tenancy management, present a medley of criteria with varying importance. Credits, used to describe a building's superior environmental performance, are calculated by multiplying the points allocated for that criterion and the value of the criterion's weight. Although no extra points are awarded, when innovative techniques and exemplary results are achieved, an Extraordinary Performance notation is documented on the assessment certificate as a highlight.

Criteria for Assessment
Points are awarded for specific criteria in each of the following areas:
- Ozone layer protection.

- Environmental impacts of energy use.
- Indoor environmental quality.
- Resource conservation.
- Site and transportation.

2.6.3 Leadership in Energy and Environmental Design (LEED)[48]

Background
The Leadership in Energy and Environmental Design (LEED) Green Building Rating System is a program of the US Green Building Council. It is a voluntary, consensus-based, market-driven building rating system based on existing proven technology that evaluates environmental performance from a "whole building" perspective over the building's life cycle.

The LEED Green Building Rating System is based on accepted energy and environmental principles and strives to strike a balance between known effective practices and emerging concepts.

Method of Assessment
LEED is a self-certifying system designed for rating new and existing commercial, institutional and high-rise residential buildings.

Rating System
LEED is a feature-oriented system where credits are awarded for satisfying each criterion. Different levels of green building certification (Platinum, Gold, Silver, or Bronze) are awarded to applicants who meet two thirds of the available credits and all stipulated prerequisites.

Criteria for Assessment
Necessary prerequisites for certification include meeting specific standards related to:
- Asbestos.
- Building commissioning.
- Energy efficiency.
- Indoor air quality.
- Ozone depletion /CFCs.
- Smoking ban.
- Storage and collection of recyclables.
- Thermal comfort.
- Water conservation.
- Water quality (lead).

Credits are available for specified performance achievement related to:
- Resource reuse.
- Recycled content.
- Construction waste management.
- Energy efficiency.
- Waste heat recovery.
- Renewable/alternative energy.
- Existing building rehabilitation.
- Indoor air quality.
- Air monitoring system.
- Landscaping/exterior design.
- LEED certified designer.
- Occupant recycling.
- Ozone depletion/CFCs.

- Siting
- Transportation.
- Water conservation.
- Water quality.

For more information on LEED, contact the US Green Building Council at 415-543-3001 or visit their website at *www.usgbc.org.*

2.6.4 Green Building Tool (GBTool)[49]

Background
Green Building Challenge '98 (GBC '98) was a two-year process of international building performance assessments that was marked by a major international conference in October 1998. The performance assessment process and conference were led by the CANMET Energy Technology Centre of Natural Resources Canada. The process led to the development of the **Green Building Tool (GBTool)**, a framework and software tool designed to assess the energy and environmental performance of buildings.

The overall goal of GBC '98 was to develop, test and demonstrate an improved method for measuring building performance, and then to inform the international community of scientists, designers and builders of the results.

Method of Assessment
The system was developed with a core component reflecting global issues, although it was also designed to accommodate variations reflecting energy, environmental and other priorities in specific countries and regions.

Rating System
The weighted score results are based on comparisons with relevant benchmarks for similar building types in that region. The industry norm sets the level for a score of zero. Scores are awarded in the range of –2 to +5. A score of –2 signifies an inferior performance assessment, while a score of +5 indicates a superior assessment. Region-specific weighting is necessary at the *Criterion* and *Sub-Criterion* levels.

Criteria for Assessment
The assessment framework is based on both quantitative and qualitative performance criteria. Parameters descend in generality from *Performance Sections to Performance Categories* to *Criteria*, and at the most detailed level, Sub-Criteria. Each parameter contains written statements related to each relevant score so that assessors can relate actual performance to the nearest relevant statements (these statements are modified for different regions).

Performance Sections of the tool include:
- Transportation
- Resource consumption.
- Environmental loadings.
- Quality of indoor environment.
- Economics
- Functionality.
- Pre-occupancy management.
- Architectural quality
- Contextual factors.

An example of a performance categories is "Quality of indoor environment," which includes:

- Air quality.
- Thermal quality.
- Visual quality.
- Noise and acoustics.

More information on GBTool and the Green Building Challenge may be obtained from the GBC Secretariat, Ottawa, Canada: 613-769-1242, or at their web site: *http://greenbuildings.ca.*

2.6.5 Environmental Status Model (ESM) [50]

Background
A group of companies involved in property management have, in cooperation with AB Jacobson och Widmark of Sweden, developed a model for the environmental auditing and assessment of existing buildings – the Environmental Status Model (ESM). ESM started in 1995 as a research and development study and has since developed into a practical instrument for environmentally oriented real estate management.

Method of Assessment
The environmental status of a building is determined in the following four steps:
- Environmental audit.
- Data processing.
- Compilation of results.
- Evaluation.

The environmental audit also addresses health aspects. The audit is primarily visual, but it also includes simple measurements of VOCs, formaldehyde, radon, and water quality. Where necessary, the audit is supplemented by questionnaires and further tests.

Rating System
The building is rated with respect to a number of environmental aspects. During auditing, each environmental aspect is classified in a 5-level response scale, as follows:

5 = Sound environmental choice throughout.
4 = Sound environmental choice in parts.
3 = Normal requirements.
2 = Unknown – needs further investigation/Bad in parts.
1 = Bad.

The results of the audit are fed into a database and processed to form an environmental report, in which the results are compiled in text and in a series of graphs that describe the environmental status of the building. The report leads to a proposal for measures that can be built into the management plan of the building.

Criteria for Assessment
The environmental assessment covers 89 questions related to the environmental aspects of a building. The questions are divided into the following four main groups:
- Indoor environment (46 aspects).
- Outdoor environment (8 aspects).
- Energy (6 aspects).
- Natural resources (29 aspects).

Further information on ESM may also be obtained through the Green Building Challenge at the address listed above.

2.6.6 R-2000

Background

The R-2000 Standard was developed by Natural Resources Canada in co-operation with the Canadian housing industry. Launched in the early 1980's, its purpose was to improve Canada's housing industry by demonstrating its full potential with the best available technology, building practices and materials. In 1994, the standard was upgraded to include total resource conservation and improve home indoor air quality.[51] The R-2000 program is a voluntary, building certification program providing the framework for the design and construction of residential buildings which have improved indoor air quality levels, are energy efficient, and address the issues of material and equipment selection.[52]

Method of Assessment

In order to achieve certification, a completed R-2000 home, built by a licensed R-2000 homebuilder, must pass all the required analysis, testing and inspection by an independent, licensed third party. Subsequently, an application must be issued to a regional office within Canada to verify that a building meets the R-2000 Standard.[53]

Rating System

The R-2000 Standard is a quality assurance standard. The rating system for achieving R-2000 certification relies on two main criteria. Primarily, the structure must successfully meet the performance and technical measurements outlined in the specification document, the R-2000 Home Program Technical Requirements. Secondly, the personnel involved in the design, building, installation, and inspection of the R-2000 home must be specially trained and have the qualifications and licenses described in the specification document. Once all reports are filed and the test results collected, all documentation is analyzed by the Home Builders' Association to verify whether all the criteria outlined above have been met.

Criteria for Assessment

Structures must conform to the technical standards of these environmental aspects:

- Minimum building envelope requirements
- Ventilation system and equipment
- Combustion equipment
- Energy performance targets
- Lights and appliances
- Indoor air quality
- Environmental features/Eco-management
- Renewable energy (in future consideration)

Note: R-2000 is not a BEPA like those described above, since it is a standard used to assure the quality of a building at its initial design and construction phase. It is included in this report because it is familiar to those involved in the Canadian residential building industry. The R-2000 standard can be used as a benchmark of quality for new construction, and it may help to achieve an EMS that encompasses the whole life of the building. Comparing the quality of an existing building to R-2000 standards may prove helpful in identifying strengths and weaknesses in a building's environmental performance, but since it mainly addresses the quality of the initial construction, R-2000 is not very helpful in assessing ongoing environmental performance.

For more information on the R-2000 program, visit the R-2000 Internet site at *www.r2000.org.*

3.0 ISO 14001

3.1 The International Organization for Standardization

Established in 1947, the International Organization for Standardization (ISO) is a federation of national standards bodies from 127 countries. Export-minded industries have long sensed the need to agree on world standards to help rationalize the international trading process. This was the origin of the establishment of ISO.

The objective of ISO is to promote the development of standardization and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing cooperation in the spheres of intellectual, scientific, technological and economic activity. Non-harmonized standards for similar technologies/methodologies in different countries or regions are perceived as "technical barriers to trade". The work of ISO results in international agreements that are published as International Standards.[54]

International standardization is a well-established procedure for many technologies in such diverse fields as information processing, communications, textiles, packaging, distribution of goods, energy production and utilization, shipbuilding, banking and financial services. The importance of international standardization is expected to grow, for all industry sectors, in the future.[55]

3.2 What is ISO 14001?

ISO 14000 is a series of voluntary international standards designed to provide a framework for the establishment and maintenance of an Environmental Management System (EMS). ISO 14000 is intended to provide organizations with the elements of an effective EMS which can be integrated with other management requirements, to assist organizations to achieve both environmental and economic goals. The standard does not establish absolute requirements for environmental performance beyond commitment to compliance with applicable legislation and regulations, the prevention of pollution and to continual improvement.[56] The standard has been written to be applicable to all types and sizes of organizations and to accommodate diverse geographic, cultural and social conditions. The rate and extent of improvement must be determined by each organization in light of economic and other circumstances. Thus, two organizations carrying out similar activities but having different environmental performance may both comply with its requirements. According to ISO, the overall aim of the standard is to support environmental protection and prevention of pollution in balance with socio-economic needs.

ISO 14000 is applicable to any organization that wishes to:[57]

- Implement, maintain and improve an environmental management system.
- Assure itself of its conformance with its stated environmental policy.
- Demonstrate such conformance to others.
- Seek certification/registration of its environmental management system by an external organization.
- Make a self-determination and self-declaration of conformance with this International Standard.

The three cornerstones of ISO 14001, as illustrated in Figure 3, are:

- Legislative compliance,
- Prevention of pollution, and
- Continual improvement.

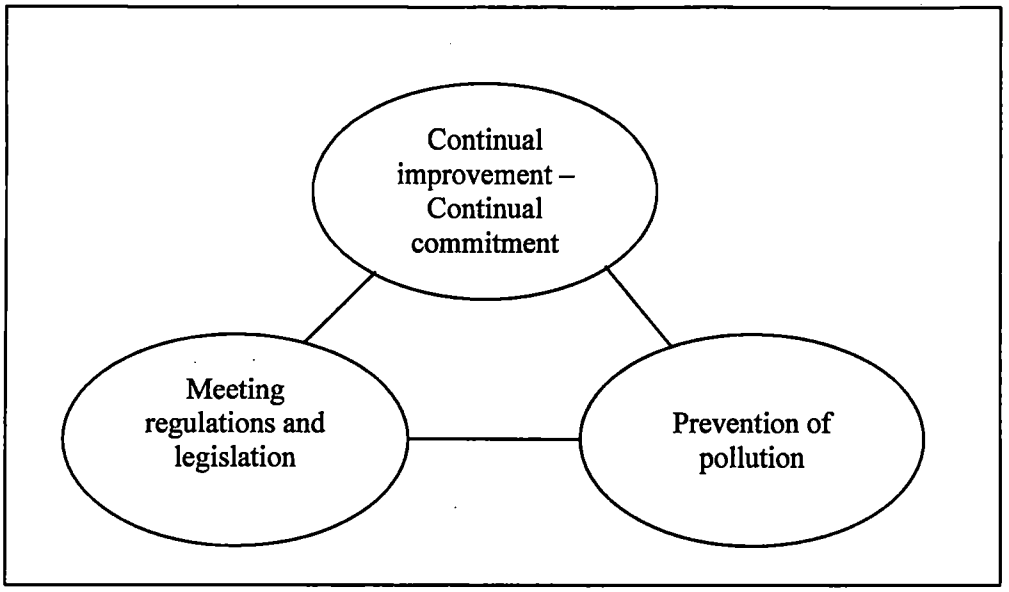


Figure 3: The Three Cornerstones of ISO 14001

3.3 A Brief History of ISO 14001

One of the most important global issues of our century is the protection of our environment and the stewardship of our natural resources. We are trying to cope with "critical environmental problems that threaten our very existence...acid rain, ozone depletion, municipal waste, industrial waste, nuclear waste, water pollution, pesticides...depletion of soil quality, deforestation, ground water depletion, loss of habitat and species extinction."[58]
In the 1970's, the environment became a major business issue: at this time, companies were beginning to be held liable for their environmental abuse and destruction. A connection was being made between business systems and ecosystems. This connection was first formally articulated at an international level at the 1972 United Nations Conference on the Environment in Stockholm. As a result of this conference, and in order to build environmental awareness and stewardship, the United National Environment Program (UNEP) was created. An independent commission, the World Commission on Environment and Development (WCED) was also established to report on the environment and development. WCED's report, Our Common Future, published in 1987, was the first UN document to call for sustainable development, and the development of effective management systems for industry. Over fifty world leaders publicly supported the report. This led to the 1992 United Nation Conference on Environment and Development (UNCED), also known as the Earth Summit, in Rio de Janiero.

In preparation for the Earth Summit, the Business Council for Sustainable Development (BCSD) established by UNCED approached ISO and the International Electrotechnical Commission (IEC) about environmental management system standards.

In order to assess the need for standardization in environmental management, in June 1991, ISO created the Strategic Advisory Group on the Environment (SAGE). SAGE recommended that ISO get involved with the development of international standards for environmental management systems. In January 1993, ISO created Technical Committee 207 (TC 207) which is charged with the development of the ISO 14000 series of standards for environmental management systems.

In 1993, TC 207 prepared the following draft standards for comment:[59]

ISO 14000 - EMS: General Guidelines on Principles, Systems and Supporting Techniques;
ISO 14001 - EMS: Specification with Guidance for Use;
ISO 14011/12 - Auditing Environmental Management Systems; and
ISO 14040 - Life Cycle Assessment: General Principles and Practices.

Through the work of ISO Technical Committee TC 207, these documents have now matured into a structured series of standards at various stages of publication. In addition to the areas originally identified, standards are being developed for emerging environmental disciplines.
Ultimately, the 14000 series will include some 20 separate standards covering everything from environmental auditing to environmental labeling to assessing life cycles of products.

The major ISO 14000 document, published in 1996, is *ISO 14001: Environmental management systems – Specification with guidance for use.* ISO 14001 is, at this point, the only "requirements" standard to which an organization can become registered; the others remain "guidance" documents.[60]

3.4 Elements of ISO 14001

ISO 14001 specifies requirements for an environmental management system, to enable an organization to formulate policies and objectives. The standard takes into account legislative requirements and information about significant environmental impacts. It applies to those environmental aspects that the organization can control and over which it can be expected to have an influence. The intent is for organizations to use the ISO 14001 standard to establish and maintain environmental management systems. It both provides an overall framework for environmental management and integrates that framework into the overall management system.[61] The standard does not state specific environmental performance criteria. ISO 14001 is the Canadian national standard for environmental management systems.

The ISO 14000 standards have been developed with the following key principles in mind:[62]

- To promote the broad interests of the public and the users of the standards;
- To be cost effective, non-prescriptive, and flexible, to allow them to meet the differing needs of organizations of any size worldwide;
- To be suitable for internal or external verification;
- To be scientifically based; and
- To be practical, useful and useable.

"[The ISO 14000] standards will ensure consistency in environmental management practice, harmonize national environmental standards within an international framework, simplify registrations, labeling and conflicting requirements, provide a single system for all transnational subsidiaries, and offer guidelines for environmental management excellence."[63]

An environmental management system based on ISO 14001 is a management tool enabling an organization of any size or type to control the environmental impact of its activities, products or services. An environmental management system provides a structured approach to:

- setting environmental objectives and targets,
- achieving these environmental objectives and targets, and
- demonstrating that the objectives and targets have been met.

ISO 14001 was developed to provide a framework for an overall, strategic approach to an organization's environmental policy, plans and actions. The underlying philosophy is that the requirements of an effective EMS are the same, regardless of business sector.[64]

According to ISO 14001, there are five key elements of an EMS:[65]

- An **environmental policy**, in which the organization states its intentions and commitment to environmental legislative compliance, the prevention of pollution and continual improvement.
- **Planning**, in which the organization analyses the environmental impact of its operations.
- **Implementation and operation**: the development and putting into practice of processes that will bring about environmental goals and objectives.
- **Checking and corrective action**: monitoring and measurement of environmental indicators to ensure that goals and objectives are being met.
- **Management review**: review of the EMS by the organization's top management to ensure its continuing suitability, adequacy and effectiveness.

These five elements together help to achieve the goal of **continual improvement.** Figure 4 illustrates the key elements of an EMS.

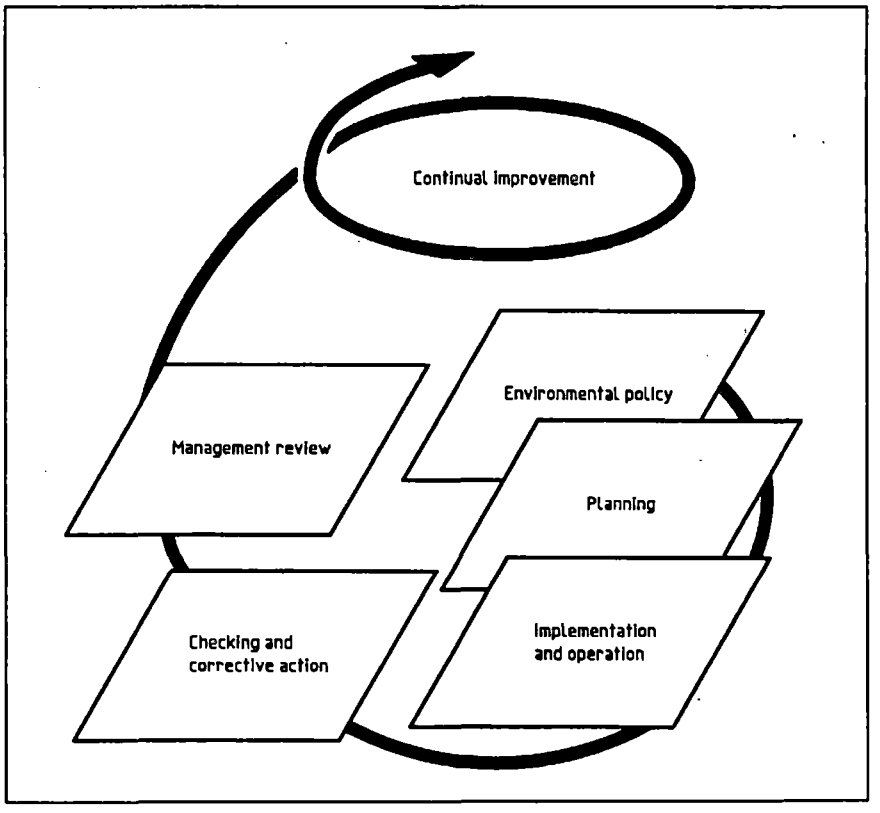


Figure 4: The Key Elements of an EMS

A copy of the ISO 14001 standard may be found in Appendix B of this report.

3.5 Benefits of Implementing an EMS

According to ISO, an EMS is a practical tool for managers who are not satisfied with mere compliance with legislation (which is often perceived as a cost of doing business). The standard is for the proactive manager who would like to implement a strategic approach to environmental management that may also result in financial gain.

Implementing an EMS is intended to provide more than just confidence that one is complying with legislation. The ISO 14001 approach forces managers to review all areas of an organization's operation and, simultaneously, any significant environmental impacts resulting from the same. This systematic approach may lead to benefits such as:[66]

- Reduced cost of waste management;
- Enhanced efficiency of an organization's processes;
- Savings in consumption of energy, water and materials;
- Lower distribution costs;
- Improved corporate image among regulators, government, customers and the public;
- Framework for continual improvement of environmental performance;
- Reduced insurance costs;
- Reduced liability due to fewer incidents and due to the dispersion of responsibilities; and
- Maintaining or improving a property's resale value.

3.6 Canadian and International Participation in ISO 14001

As of October 1999, nearly twelve thousand organizations are registered under ISO 14001 worldwide, with an average of 500 new registrants every month. Ranked by total number of registrations, Japan and Germany lead the world with 2531 and 1460 ISO 14001 registered organizations respectively. Canada ranks twenty-first, with 115 registrations. In terms of number of registrations relative to population, Sweden ranks first, and Canada ranks twenty-second. Sweden also leads the world in registrations relative to Gross National Product, while Canada ranks thirty-third. In terms of national wealth, Canada ranks twelfth.[67] If Canada wishes to be a world leader in ISO 14001 compliance, it must do more to encourage participation.

3.7 Europe's EMAS Program

Like ISO 14001, Europe's Eco Management and Audit Scheme (EMAS) is a registration system to recognize an EMS. It requires a company to develop an environmental policy statement and like ISO 14001, it requires commitment to continual improvement.

EMAS has stricter requirements than ISO 14001: for instance, EMAS requires every registered company to produce an annual report on its environmental performance, outlining the year's objectives and how well they were met. The annual report must also note future plans of the company that could have a significant environmental impact.

Countries that participate in EMAS are taking environmental issues very seriously, and it is expected that they may lobby for more aggressive criteria to be included in the ISO 14000 series of standards. Presently, many European companies are using ISO 14001 to manage the environmental requirements of EMAS.

Figure 5 illustrates the number and distribution of ISO 14001 and EMAS registrations worldwide.[68] Germany is a leading country in certification under both standards.

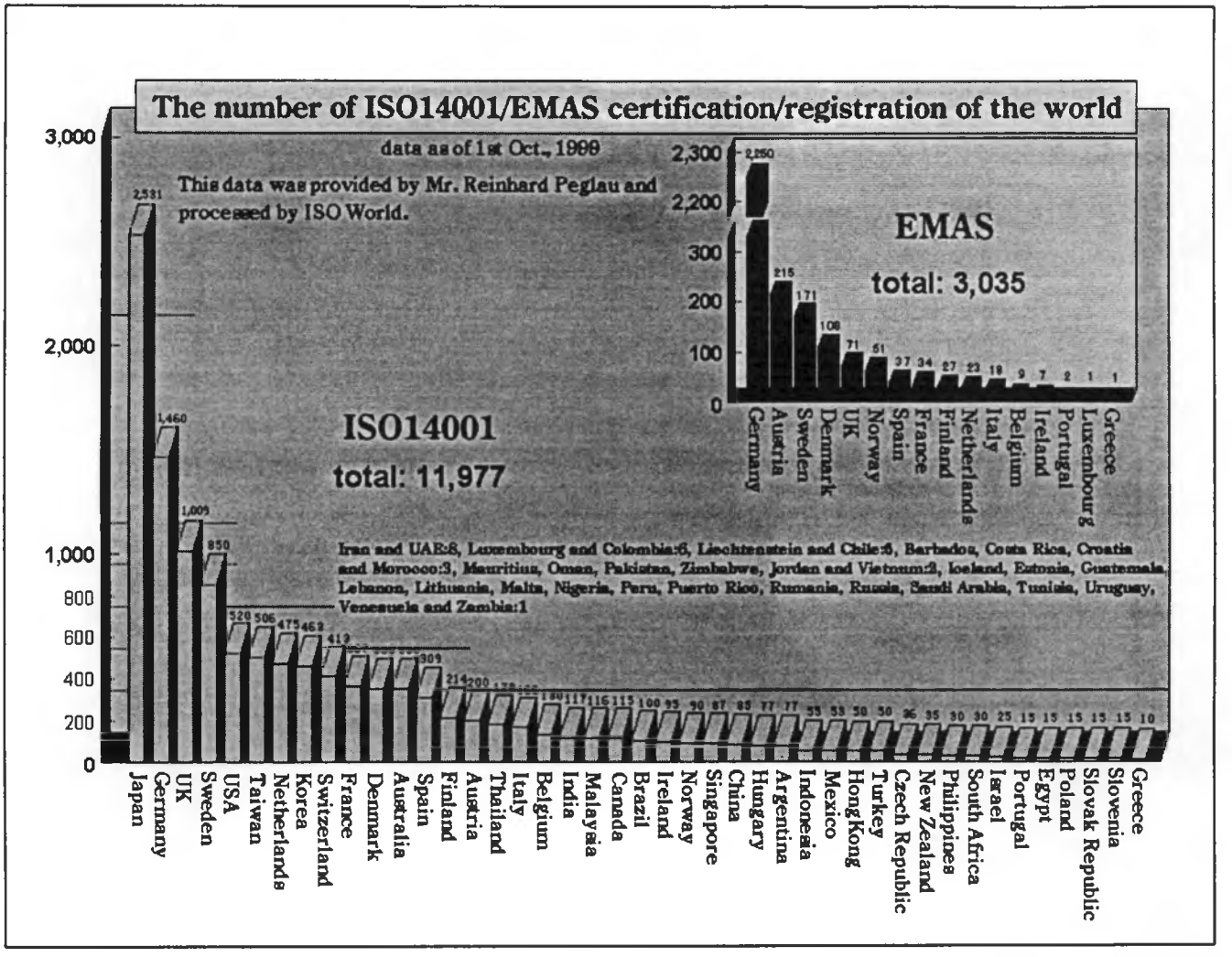
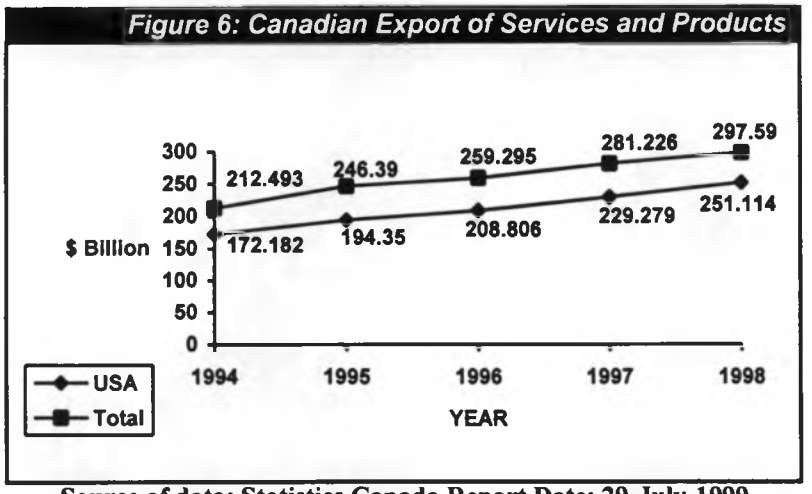


Figure 5: Number and Distribution of ISO 14001 and EMAS Registered Organizations Worldwide

In 1999, the Ontario Ministry of the Environment established a goal of EMS registration of one thousand industries in the province by 2003. So far, Ontario is the only Canadian province to take an initiative in encouraging the use of environmental management systems. It has been suggested that with support from the federal government, other provincial ministries could take up the initiative. According to The Auditorial, newsletter of the Canadian Environmental Auditing Association, "systems are available upon which industries can rely to manage their environmental program. These systems are cost efficient and they provide participating industries with the public and market credibility required for operations in the global marketplace." The Auditorial also recommends tax relief as an incentive for the development of an EMS. [69]

3.8 Export Markets and International Standardization

As trade barriers have loosened in the past few decades, Canada's export market has substantially increased. Canada's service industry has also experienced growth in international trade. Figure 6 illustrates the growth in export of Canadian services and products since 1994.



Source of data: Statistics Canada Report Date: 29-July-1999

Property management is no different: several of Canada's larger real estate management companies have recently developed as international players. For example, one company holds an important shopping centre portfolio in the United States, in partnership with several major real estate companies, as well as an interest in a Spanish real estate company. The same organization has developed agreements with prestigious real estate partners in Canada, the United States and Europe, while acquiring interests, at home and abroad, in publicly traded companies and various properties.[70] The international market for building management services, including the management of residential properties should not be ignored.

3.9 ISO 14000 and ISO 9000

ISO 9000 is a series of international standards for quality management systems first introduced in 1987. At the time, the concept of an international management standard such as ISO 9000 was a very new idea, and it took some time before the standard became accepted. Now ISO 9000 is a well-known and accepted management tool in many industries around the world. It is interesting to note that ISO 14001 has gained popularity much more quickly than ISO 9000, although its initially steep increase in registrations has begun to reach a plateau. To date, about a dozen Canadian organizations involved in property or asset management have registered with the ISO 9000 series of standards. None of these are strictly residential managers.[71]

The ISO 14000 series shares common management system principles with the ISO 9000 series. Both standards require companies to have a general policy, which provides the framework for setting and reviewing objectives and targets. They also require that companies perform a management review and have procedures in place to address corrective and preventive actions and training. The two standards were designed with the intent that their common elements could to be implemented in a shared manner, without redundant duplication or conflicting stipulations. The idea of establishing one system integrating both aspects of management could potentially reduce implementation time, improve staff productivity and ultimately, decrease expenses.[72]

There are, however, key differences between the ISO 14000 requirements and the ISO 9000 series. While ISO 9000 concentrates on product quality and meeting customer requirements, ISO 14000 focuses on all aspects of a company's environmental operations. In addition, when comparing ISO 9000 and ISO 14000, it is evident that there are subtle differences in terminology, structure and concepts. "In a survey of ISO

9000 users from 40 countries, 34 per cent cited difficulties with the differences between ISO 9000 and 14000, and 88 per cent expressed a desire for more compatibility between the two."[73]

In order to improve the compatibility of two standards, the Joint Task Force considered the following recommendations:[74]

Use common definitions of common terms such as policy, objectives, targets and planning.
Include the concept of a continual improvement loop (from 14000) in the text of future 9000 standards.
Make management system definitions the same.
Reduce complexity in the texts of 9001 and 14001.

At the ISO/TC 207 team meeting on May 31, 1999, "it was established that the main elements of compatibility between ISO 14001 and ISO 9001 had been achieved."[75]

3.10 Anticipated Future Directions of ISO 14001

ISO 14001 is still in the developmental stage, and will be undergoing modifications and additions. "The 14001/04 standards are under review with an eye to compatibility and the needs of small- and medium-sized businesses. New editions are scheduled to be published in 2001."[76]

In order to understand the direction in which ISO 14001 is heading, the manner in which the advisory committee ISO/TC 207 is proceeding must be considered. At the 7th Plenary meeting for the ISO/TC 207 team held in Seoul, Korea on May 31th-June 6th, 1999, thirty-six resolutions were decided. Five major items topped the discussions. These were:[77]

- To promote and encourage the active participation of developing countries in the work of ISO/TC 207;
- To continue and encourage interaction with non-government organizations (NGO);
- To continue the dialogue with the United Nations Framework Convention on Climate Change (UNFCCC) on possible ISO standards related to climate change and climate technology;
- To note that France and Korea will put forward a new proposal to develop a document on Design For the Environment; and
- To create a Spanish Task Force for the purpose of translating the ISO 14000 standards into Spanish.

Proposed changes to ISO 14001 include a requirement for more information to be available to the public, including a list of environmental aspects that an organization will address in its EMS. Another proposed change is a requirement for more performance-based improvements, rather than improvement solely in the management system.

Although many organizations have set a goal of ISO 14001 compliance by the new millennium, recognition if ISO 14001 is still at an early stage, and to a large extent, its implementation is being driven by the major industries that are adopting the standard. In September 1999, General Motors, Ford and Daimler Chrysler, three major automobile manufacturers, announced their goal to require all their suppliers and support facilities to be registered under ISO 14001 by 2003. This is seen by some as a "catalyst [that is] needed in order to move Canadians back into prominence as environmental stewards."[78] It has also been suggested that "this initiative will allow our governments to be more positive in their support of EMS as an adjunct to their regulatory activities."[79] Other industries that are currently active in seeking ISO 14001 registration are the forestry sector, including pulp and paper manufacturers and the chemical industry.

4.0 INDUSTRY INTERVIEWS

4.1 Overview

The purpose of conducting industry interviews was to gather information from within the building management industry on the level of ISO 14001 awareness, its function and applicability, and the perceived need for and acceptance of a standardized residential building EMS. The survey questions, which may be found in Appendix C, were also designed to identify market forces that would encourage the acceptance of ISO 14001, along with existing opportunities for and barriers to the acceptance and use of the standard. The results were tabulated in two key groups: Group One respondents, who were selected from a broad range of related industries, and Group Two respondents, who are directly involved in residential property management. The following sections outline the composition of participants involved in the interviews and indicate highlights of the results obtained.

4.2 Participants

Twenty-nine advisory board members from various industries related to building management were contacted and invited to participate in the telephone survey phase of the research. Of these, twenty-one elected to complete the survey, including ten participants who are directly involved in managing residential apartment buildings, condominium complexes, offices or commercial properties. Other people interviewed include government employees, ISO 14000 experts, product and services suppliers, health and environment experts, and property management association members. These people were interviewed to provide a sampling of perspectives for the purposes of this research. A break down of survey participant composition is presented in Figure 7. Appendix D contains a complete listing of the advisory board members who were invited to participate in the study.

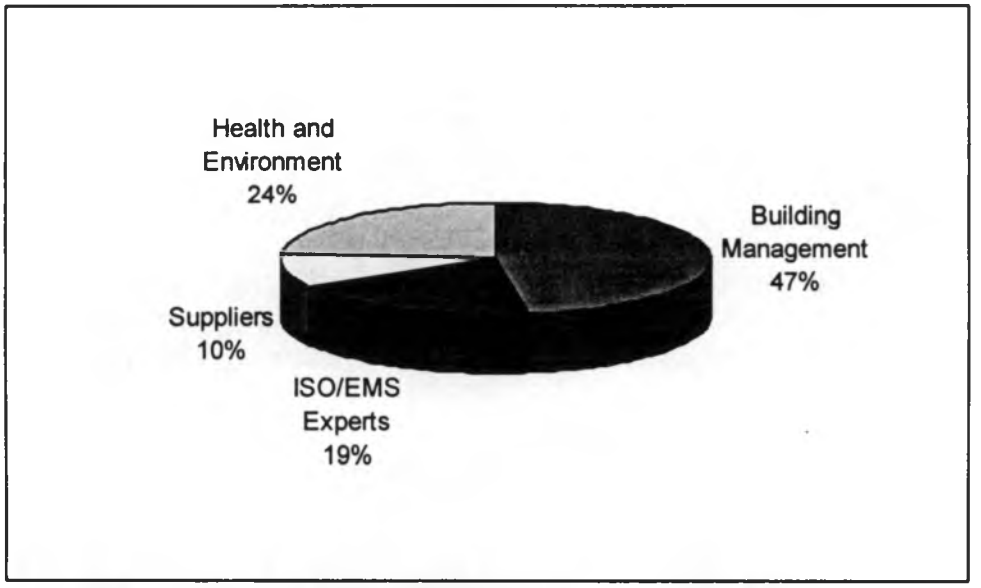


Figure 7: Advisory Board Member Survey Participant Composition

All participants were interviewed via telephone between August 24th, 1999 and September 10th, 1999. Interview questionnaires were sent to each of the participants prior to the telephone interview to encourage detailed and complete responses, and also to allow the participants some time to think about and/or research answers to the questions. Sections 4.3 and 4.4 summarize the key results and observations from the telephone interview. Refer to Appendix E and Appendix F for complete details of the survey results.

4.3 Results - General

4.3.1 Building Management

Formal building management systems are more prevalent in the industrial, commercial and institutional (IC&I) sector; 91% of the IC&I survey participants use formal systems, as opposed to 60% of the residential sector participants. This may be because the residential industry, for the most part, is made up of small to medium size organizations. However, the residential industry seemed to be more informed about other sources of information related to building management practices/systems than the IC&I industry. Overall, the building managers are well aware of environmental issues and they are integrating recycling of solid waste, water conservation and energy conservation in their management systems. It was observed that the IC&I sectors are more formal about their approach, such that audits are done to review and improve performance. As well, the IC&I sectors are dealing with hazardous/special waste management in a more rigorous way.

4.3.2 Environmental Management

Overall, the use of environmental management systems (EMS) within the building management industry is quite low. Only one IC&I example, an office tower Calgary, was found to be ISO 14001 certified. The residential participants appear to be less informed about ISO 14001, when compared to the IC&I participants. This suggests that the IC&I sector is more likely to pursue an EMS in the short term, with the residential sector to follow. Regardless of sector, all participants agree that integrating environmental issues into building management is very important, with an average ranking of 4.38 out of 5 (5 being very important).

4.3.3 Acceptance

The respondents indicate, on a reserved level, that ISO 14000 has a role to play in building management, but that building managers may have a hard time adopting ISO 14001 into their management system. As one respondent indicated, "management dislike being evaluated on ISO 14001 terms, as it will make them more accountable and subject to higher levels of scrutiny." Cost savings were clearly identified as the number one market force that would motivate the building management industry to use ISO 14001. Among the other top market forces are tax incentives, regulations/legislation and insurance savings. The industry does not see itself as an exporter of services, and therefore the export of services market force scored low. Respondents ranked improved building performance, liability limitation, ability to demonstrate due diligence and reduced costs as important benefits that could be realized from the use of an ISO 14001 EMS. Both liability limitation and ability to demonstrate due diligence ranked higher within the IC&I sector than in the residential. National or international recognition ranked the lowest overall. The survey included the study of barriers as well as benefits. Top barriers include: the work and time spent maintaining the EMS documents, the cost of establishing ISO 14001 certification and the lack of market demand. Surprisingly, tenant issues, over which building mangers have little control, ranked low as a barrier.

4.3.4 ISO 9000

Since ISO 9000 international quality management systems standard has been in existence longer than the ISO 14001 standard, it was felt that asking a few questions about ISO 9000 would help to determine the acceptability of the international standards approach. It was found that few of the respondents (25%) are ISO 9000 certified, and a little over half have considered ISO 9000 certification. Based on the above results, it is anticipated that over time, ISO 14001 and the international standards approach will be more widely accepted in the market place. Currently, only one building management firm was found to be ISO

9000 certified. It appears that a considerable part of the building management industry is still unfamiliar about ISO standards, and that greater awareness may be needed in order to determine its acceptability.

4.3.5 Tenant Issues

Tenants, or inhabitants, are an integral part of all buildings and, as such, are an important element of any EMS. Unlike most other elements of the system, building managers cannot directly control tenant behaviour; but they can influence it. The respondents collectively viewed that tenants would play an important role in a building's EMS. The participants were surveyed to gauge which incentives they thought would motivate tenants to co-operate with an EMS. The top incentive was a rent reduction/cash incentive. Although the overall ranking of communication as a means of gaining tenant co-operation was only 3.48 out of 5, about 60% of respondents ranked regular communication as a very effective means of motivating tenants. The participants did not believe environmental protection issues to be important enough to tenants; it was ranked at the bottom of the incentive criteria. In a further study, it would be advantageous to interview tenants to see if their ranking of tenant co-operation incentives would coincide with the industry's perception.

4.3.6 Building Products, Services and Utilities

This section of the survey responds to another outside force that the industry must deal with. Like tenants, the building products, services and utilities sector is an aspect of building management that the industry can influence but cannot control. Respondents indicated that overall, an EMS would be useful in helping the industry assess and procure products, services and utilities. Within the IC&I sector there seems to be a stronger belief in using an EMS for this purpose: 60% ranked it at 4 to 5 out of 5 (5 being very useful), while 60% of the residential sector ranked it at 3. Unanimously, respondents said that an EMS within the building management industry would definitely influence the way organizations manufacture, market and supply their product, service or utility.

4.3.7 Building Environmental Performance Assessment

Building Environmental Performance Assessment tools (BEPA) arrived on the building management scene a few years prior to ISO 14001. This section of the survey plays a similar role to the section on ISO 9000: it was included to help gauge the industry's acceptance of building environmental performance issues as a measure of its ability and likelihood to accept ISO 14001. There is a significant difference between a BEPA and EMS; however, the use of a BEPA is beneficial in helping to set goals and objectives for an EMS and, more directly, to measure the performance of an EMS. Some of the respondents in the IC&I industry (approximately 30%) have used a BEPA in their building management activity. None in the residential sector have used a BEPA, although all the residential building management respondents indicated that they are familiar with BEPAs. Perhaps the residential sector needs more access to information about the benefits of using Building Environmental Performance Assessment tools.

The IC&I sector have incorporated BEPA requirements into their building management through:

- preventative maintenance programs;
- work plans;
- communicating environmental costs to their client;
- waste audits; and
- in-house programs (both computer and human resource based).

When asked how useful BEPAs are to building management, the average response in the IC&I sector was 3.8 out of 5 (5 being very useful); 56% responded in the 4 to 5 range. Only one respondent from the residential sector answered this question, and gave the usefulness of BEPAs a rank of 3 out of 5.

Respondents indicated a strong belief in a relationship between BEPA and ISO 14001. Even though there is a radical difference between the two, respondents believed that the BEPA tool could be:

- used to fill in the EMS framework;
- used as a checklist when setting goals, targets and objectives;
- integrated into the EMS;
- used to measure performance to monitor continual improvement;
- used to identify performance measures and environmental aspects; and
- integrated within the preventative maintenance program.

Currently, ISO is working on Document 14031, which will focus on Building Environmental Performance Assessment tools.

4.4 Results – Following the Structure of ISO 14001

The following section focuses on the pertinent structural elements of ISO 14001, and surveys the building management industry's ability to conform to some of the more difficult elements of the standard.

4.4.1 Environmental Policy

Overall, it was found that the majority of industry participants do, in fact, set policies for their organizations; however, not all of them set specific environmental policies. Nonetheless, policy setting is a current practice of the industry. The policies are communicated to employees and outside organizations in a variety of ways (refer to Appendix E: Results of the Telephone Survey), but the recording of the policy is not necessarily as formal as may be required by ISO 14001. Some organizations have a strong private sector attitude, and therefore do not communicate their policies outside of their organization. Environmental policies under ISO 14001 must be accessible to the public and other stakeholders, which may pose a problem for this type of organization.

In all cases, participants responded that top management must fully support the environmental policies - but depending on the size, type, reporting structure and portfolio of the organization, the role of top management may vary. In some organizations, middle management is responsible for making decisions, while in others the president or CEO must make the final decision.

4.4.2 Planning

One fundamental component of ISO 14001 is the identification of environmental impacts of an organization. Overall, the respondents did not feel that the building management industry had much of an impact on environment, with an average rank of 3.7 out of 5 (5 representing a very large impact). It is interesting to note that 60% of the IC&I sector responded with a ranking of 4 to 5, while 80% of the residential sector responded with a rank of 3.

When asked if respondents have a procedure in place to identify and access legal and other requirements, over 80% indicated that they had a process: the majority have informal, adhoc ways of monitoring workplace legal issues. It was found that on average, current industry methods of demonstrating regulatory compliance are not rigorous enough to fulfil ISO 14001 requirements. Regulatory compliance is one of three corner stones of ISO 14001. If members of the building management industry are to become certified, they will need to develop improved methods of monitoring legal issues.

As for the ISO 14001 requirement of setting objectives and targets, well over 80% of respondents indicated that their organizations do this regularly. Few stated that their objectives and targets focus on environmental impacts; the majority focus on business, strategic and financial objectives. Nonetheless,

objectives and targets are a fundamental aspect of most respondents' day to day business. Monitoring of objectives and targets sometimes occurs in a very formal way, but it mostly happens informally, and sometimes it does not happen at all. The IC&I sector respondents tend to be more aggressive about setting their objectives and targets and monitoring them.

4.4.3 Implementation and Operation

When asked who in building management is best suited to establish, implement and maintain ISO 14001, a variety of mostly front-line managers were identified. It is believed that they have two very essential characteristics: technical knowledge and decision-making powers. It is interesting to note that two different models of the allocation of responsibilities for ISO 14001were presented - Option One: one person having complete authority and responsibility at the management/senior level; and Option Two: a group/team of front-line employees and management combined.

Training and awareness is fundamental to an EMS. All respondents indicated that they engage in continued education within their operations. Many (about 80%) of the respondents plan both formal and informal training methods. On-the-job training and workshops/seminars were the most popular methods, with conferences ranking closely behind. The interview results indicate that training may extend beyond employees: some organizations offer tenant training and awareness programs (80%) and, to a lesser degree, contractor training and awareness (63%). In both cases, the residential sector lags behind by about 20%.

Many forms of internal and external communication are utilized within the building management industry (see *Appendix E: Results of the Telephone Survey* for details). Two key observations that set the residential respondents apart from the IC&I sector are that in the residential sector, paper based communication is utilized more, and that the Internet, at this time, is used less. The interviews indicate that all participants communicate with the tenants.

Written documentation of building management systems is more prevalent within the IC&I participants: 83% indicated that they have written documentation, compared to only 40% of the residential respondents. Participants indicated a ranking of 3 out of 5 (5 being very difficult) when asked how difficult the task of integrating an EMS into existing building management procedures/manuals would be. The majority of the documentation forms utilized by residential participants are informal, with the exception of equipment and system-oriented manuals and financial reports.

In addition to questions concerning the implementation and operation aspects required by ISO 14001, the interviews included questions on operational control and emergency preparedness and response. The responses revealed that with the typical current industry practice, the building management industry will be able to meet EMS requirements easily.

4.4.4 Checking and Corrective Action

Checking and corrective action is an aspect of an organization that is often overlooked. In an EMS context, checking and corrective action and management review are critical last steps within the continual improvement model. Residential respondents mirror the responses of the IC&I sector. The most prevalent methods of monitoring and measuring of a building's condition include preventative maintenance, routine checks and response to tenant complaints or problems. Residential respondents lag behind the IC&I respondents in terms of waste disposal, indoor environmental controls and tracking of energy consumption. Generally, the residential and small size IC&I operators respondents had the least formal tracking methods.

4.4.5 Management Review

The majority of interview participants have management review systems in place. They typically deal with traditional operational concerns, few of which are integrating environment. Very few of the respondents indicated project specific reviews. One respondent indicated that "management seldom are/like to be reviewed and that the ISO 14001 would definitely challenge management to a point where they will feel uneasy". This may be one of the major hurdles that need to be overcome.

4.5 General Comments

Unlike the IC&I respondents, none of the residential interviews indicated any awareness of work underway concerning ISO 14001 and building management. This indicates that the residential sector has little to no awareness of ISO 14001. Further suggestions and comments from the industry participants about the role that ISO 14001 may have in residential building management are summarized as follows:

- The cost benefit must be emphasized;
- The benefits to owners must be stressed;
- There must be a balance between voluntary and regulatory compliance;
- Direct interaction and feedback from owners is needed;
- Market demand is necessary;
- Pilot projects are required;
- Paperwork must be kept to a minimum;
- Government assistance is required;
- The ability to solve day-to-day problems must be stressed,
- Sector specific guides are needed;
- ISO documents need to be simplified and presented in a clear easy-to-read language, particularly for smaller organizations;
- Awareness must continue to be built; and
- Practicality for residential buildings needs to be considered.

Lastly, when participants were asked at what scale of operation they felt implementing an EMS would be beneficial, their answers were not consistent. Most participants responded that an EMS would be of benefit to medium-sized or large organizations. A couple of respondents indicated that size was not an issue: ultimately, we have a responsibility to abide by the law and to act responsibly regardless of size.

5.0 THE ISO 14001 FRAMEWORK AND RESIDENTIAL BUILDING MANAGEMENT

5.1 Overview

The ISO 14001 standard provides a very broad, generic framework for the development of an EMS. This is intentional, since the standard was designed to be used by many different organizations that participate in a wide variety of activities. In order to define the role ISO 14001 might specifically play in residential property management, it is necessary to determine the roles and responsibilities of the key players in this particular industry, with respect to the standard. It is also important to look at the standard in greater detail, and to try to find ways of applying these requirements to residential property management.

5.2 Key Players

5.2.1 Owners

The owner's primary role in the application of ISO 14001 is commitment to compliance with the standard. The owner must understand the key elements of the standard, and be willing to commit the time and money it will take to develop and implement an EMS. The owner must also be willing to allow the environmental policy to be made available to the public. In situations where there is not an individual owner, top management must be committed to ISO 14001 compliance: for example, the CEO of a large corporation, or the board of directors of a condominium, co-operative or non-profit housing organization.

5.2.2 Asset Manager, Property Manager, Building Manager

Since they make many financial decisions and are responsible for record keeping, management figures play a critical role in the application of an ISO 14001 EMS. Property and building managers deal with everyday, front-line building management issues. Managers are given responsibility; in order to use their power to effectively develop and implement an EMS, they need access to resources, both financial and human. It is the manager's job to keep logs of energy consumption, develop and implement waste management procedures, hire maintenance contractors (such as elevator and security companies) and order supplies. Although managers cannot control, but only influence the contractors they hire, they can require specific qualifications of bidders, including environmental practice.

Managers must be able to set the objectives and targets of the EMS, and develop systems for achieving and monitoring the results. Managers must also communicate with the Owner, employees, contractors, consultants and tenants.

5.2.3 Contractor or Consultant

Contractors and consultants must be aware of the requirements of an EMS and, under the direction of the Manager, define how they are to conform to the requirements.

5.2.4 Tenant/Building Occupants

Building occupants will play a vital role in the implementation of an Environmental Management System. Since they are the end users of the building, their level of acceptance and consequential actions will have a great impact on the success of an EMS. A special clause in a contract or lease agreement may be necessary in order to define the expectation of a tenant's behaviour on an environmental level.

5.3 Application of the ISO 14001 Framework To Residential Property Management

Based on research and interviews conducted with residential building managers identified in Appendix D, Table 2 on the following pages provides a preliminary analysis of how the requirements of ISO 14001 can be applied in a residential building management context. Refer to the standard in Appendix B for further details.

Table 2: Analysis of ISO 14001 Requirements Applied to Residential Building Management

ISO 14001 CLAUSE	SUMMARY OF REQUIREMENTS	RESIDENTIAL BUILDING MANAGEMENT CONSIDERATIONS
4.1 General requirements		
4.1 General requirements	The organization shall establish an EMS, as described in the whole of clause 4.	• Owner's and/or upper management commitment is necessary. • Use existing systems as much as possible. • Industry associations and other organizations may require assistance. A steep learning curve will be inevitable. • May require a new full time individual to coordinate. If some one on staff is assuming the responsibility it will require a significant commitment. • This industry, like others, is limited in the amount of resources it can bring to an EMS. Nonetheless, it can be done. • Industry will perceive these requirements as expense oriented with little benefit. Case studies will help as benefits can be more clearly analyzed and expressed. • Informal easy-to-do and implement methods are a requirement.

4.2 Environmental policy		
4.2 Environmental policy	Scope suits nature, scale and environmental impacts of activities. Includes commitment to continual improvement and the prevention of pollution. Includes commitment to comply with relevant legislation and regulations and other requirements to which the building subscribes. Provides framework for setting and reviewing objectives and targets. Documented, implemented and maintained and communicated to all employees. Available to the public.	• Property Management companies will need to incorporate environmental policies within their existing corporate policy and maintenance documentation. • Many companies will need to make their policies available to the public, as this is not currently done. • Legislative compliance is currently being carried out for the most part on an ad hoc basis. However, there is no specific system to keep up-to-date within the industry. • A framework for setting and reviewing objectives and targets within this industry is not done except for financial issues. • Documented maintenance systems exist, but they are the exception and not the norm. This will be difficult to do, as informal systems are preferred/used. • Not-for-profit organizations are more receptive to being public about internal information, whereas the for-profit organizations are not.
4.3 Planning		
4.3.1 Environmental aspects	Establish and maintain procedures to identify the aspects of its activities that it can control and be expected to have influence. Determine significant aspects. Consider the significant aspects when setting the objectives. Keep this information up to date.	• The majority of the industry is not familiar with identifying environmental aspects. A guide to carry out the tasks associated with this section is important. • Some companies may consider hiring a consultant to assist with these tasks. • Various Building Environmental Performance Assessment Tools (BEPA) can assist with the identification of environmental aspects. • Assistance to the industry will be required in helping them to determine environmental aspects and significance. • A review of once or twice a year will be required.

4.3.2 Legal and Other Requirements	Establish and maintain a procedure to identify and have access to legal and other requirements to which the building subscribes, that are applicable to its aspects.	• Establish systems through associations and other related organizations in order to disseminate information on legislation, regulations and recent updates. • Various organizations monitor legal and other requirements, however, not in a rigorous way.
4.3.3 Objectives and targets	Establish and maintain documented environmental objectives and targets at each relevant function and level. When establishing the objectives, consider: • Legal and other requirements. • Significant aspects. • Technological options. • Financial, operational and business requirements. • Views of interested parties. Be consistent with the policy and commitment to the prevention of pollution.	• Financial targets and objectives are set by the building management industry. However, few to none in the industry set environmental objectives and targets at each relevant function and level.
4.3.4 Environmental management program(s)	Establish and maintain programs to achieve objectives and targets, to include: • Designation of responsibility for achieving objectives and targets at each relevant function and level. • The means and timeframe by which they are to be achieved. Amend program if new developments/activities occur to ensure it applies to those.	• Property managers and other related management will need to take the lead. They will also require financial, human and other resources. In addition, they will have to motivate and monitor the programs. • Currently, the industry has little to no experience in designing environmental management programs.

4.4 Implementation and operation		
4.4.1 Structure and responsibility	Define, document and communicate roles, responsibilities and authorities to facilitate effective environmental management. Management shall provide the necessary resources to implement and control the EMS, to include: • Human resources and specialized skills. • Technology. • Financial. Top management shall appoint someone to be responsible for: • Ensure EMS requirements are established, implemented and maintained. • Report on the performance of the EMS to top management as a basis for improvement.	• Various players, including cleaning, administrative and maintenance staff will need to understand their new environmental management role. • Others outside of the organization such as contractors, suppliers and consultants will need to be integrated within the EMS and also briefed. • Tenants and their role should also be considered. Although tenant participation may appear to be an indirect aspect, it is a significant aspect that must be addressed. Management must endeavour to influence tenant behaviour, through specific environmental clauses in rental agreements. • As both owners and tenants, condominium owners and co-operative members have dual responsibility for implementing and participating in an EMS. • Most likely will require a full time individual/commitment. • Currently, the industry has little to no experience in reporting on performance.

4.4.2 Training, awareness and competence	Identify training needs. Require all personnel whose work may create a significant impact to receive training. Establish and maintain procedures to make its employees at each relevant function and level aware of: • The importance of conforming to the policy and procedures and the EMS requirements. • The significant impacts, actual or potential, of their work and the benefits of improved personal performance. • Their roles and responsibilities in complying with the policy and the EMS. • The potential consequences of not complying. Personnel performing tasks, which can cause significant impacts, shall be competent on the basis of education, training and/or experience.	**For Staff:** Training procedures can be incorporated into existing training programs and methods: • Workshops; • Staff meetings; • Manuals; • Conferences; and • On site training. **For Tenants:** Educating the tenants will be important to the successful implementation of an EMS. Awareness methods include: • Tenant meetings; • Notices posted in the building; • Pamphlets; • Newsletter; and • Lease Agreement. For Contractors, Consultants and Suppliers: Awareness methods include: • Memos, letters and pamphlets; • Briefing and project meetings; and • Pre-qualification procedures. • To some extent, personnel whose work can result in a significant impact already receive training. This is due to the fact that high-risk items need to be controlled because of liability. The actions of contractors or suppliers may be considered a direct environmental aspect. On site, the owner has direct responsibility for the safety and actions of contractors or suppliers and may have an employee accompany them to ensure the company procedures are followed.

4.4.3 Communication	Establish and maintain procedures for: • Internal communications between various levels and functions. • Receiving, documenting and responding to relevant communication from external parties. Consider processes for external communication on its significant aspects and record its decision.	• Use existing systems and channels as much as possible to communicate with tenants, employees, contractors, consultants, suppliers, the owner and the public. • The industry will only respond to non-exhaustive approaches.
4.4.4 Environmental management system documentation	Establish and maintain information, in paper or electronic form, to: • Describe the core elements of the EMS and their interaction. • Provide direction to related documentation.	**NOTE:** Written EMS documentation is not a requirement of ISO 14001. However, without written documentation compliance is next to impossible. • Written documentation of management systems is currently kept to a minimum. This requirement of the standard may be a problem for the industry. It is advisable to integrate these requirements within existing systems. • Assistance in the form of sample documents may need to be produced by industry associations and other organizations. These templates will assist the industry. • Industry perceives little benefit to this issue as they associate great financial expense. Case studies would demonstrate that there are in fact significant advantages associated with system documentation: for example, if an organization is experiencing staff turnaround, system documentation will make it easier for new staff to integrate into their position quickly.

4.4.5 Document control	Establish and maintain procedures for controlling all documents to ensure that: • They can be located. • They are periodically reviewed, revised as necessary and approved by authorized personnel. • The current versions are available at all locations critical to the EMS. • Obsolete documents are promptly removed from all points of use. • Obsolete documents retained for legal and/or knowledge preservation are suitably identified as such. Documentation shall be legible, dated, identifiable, maintained in an orderly manner, and retained for a specified period. Establish and maintain procedures and responsibilities concerning the creation and modification of the various types of documents.	• Would be beneficial if currently used computer software and other systems were capable of integrated the EMS documentation requirements: for example, the fire safety manual. • Currently, document controls rarely exist. The industry has little to no direct experience. • Industry perceives little benefit to this issue as they associate it with great financial expense. Case studies would demonstrate that there are, in fact, significant advantages associated with document control. For example, document control will easily identify costly problems resulting from equipment/system failures.

4.4.6 Operational control	Identify the operations and activities that are associated with the significant aspects, policy and objectives and targets. Plan these activities to ensure they are carried out under specified conditions by: • Establishing and maintaining documented procedures to cover situations where procedural absence could lead to deviations from the policy, objectives and targets. • Stipulating operating criteria in the procedures. • Establishing and maintaining procedures related to significant aspects of goods and services used and communicating requirements to suppliers and subcontractors.	• Responsibilities that are delegated will require back-up plans as well. • Tenant, contractor, consultant and supplier issues are also to be integrated into the operational controls. This requires good and ongoing communication. EMS based requirements will have to be included within the specifications, terms of reference and request for proposals.
4.4.7 Emergency preparedness and response	Establish and maintain procedures to identify potential for and respond to accidents and emergency situations, and for preventing and mitigating the impacts that may be associated with them. Review and revise the procedures where necessary and especially after an accident or emergency. Periodically test such procedures where practical.	• This requirement of the standard implies that periodic tests be conduct to see if the EMS is working: for example, fire drills. • The focus of this section is on environmental aspects that can result in great harm. Within this industry, it can amount to about 10 aspects of a typical operation. • Various new emergency procedures will need to be integrated into existing systems, like the fire safety plan manual. • New emergency procedures can include system failures, power outages, spills, hazardous chemical fires etc. • As these issues are high risk, industry will not have a problem with this section as it protects their interest. Due diligence, along with cost savings, are inherent benefits.

4.5 Checking and corrective action		
4.5.1 Monitoring and measurement	Establish and maintain procedures to monitor and measure the key characteristics of its operations and activities that can have significant impact, to include: • Recording of information to track performance, relevant operational controls and conformance with the objectives and targets. Calibrate and maintain monitoring equipment and record this. Establish and maintain a document procedure to periodically evaluate compliance with relevant legislation and regulations.	• Some monitoring is taking place within industry that demonstrates the skill set. Most is financially motivated and some is utility consumption oriented. • Monitoring tenant performance may prove difficult for certain aspects. However, it would be possible to monitor for example water and energy consumption at an individual or/and unified level. • Industry, for the most part, does calibrate and maintain various pieces of equipment. However, it could be more thorough as greater system efficiency will result. • Use BEPA's to perform yearly audits on the building. A rating system would be beneficial since one could see the improvements in the results.
4.5.2 Nonconformance and corrective and preventive action	Establish and maintain procedures for defining responsibility and authority for handling and investigating nonconformance and taking the necessary actions to correct the situation. Action taken shall reflect scope of the problems and impact encountered. Implement and record any changes in the documented procedures as a result of the action.	• Few in the industry are checking their management systems for nonconformance. Without this, corrective and preventative action will not take place.

4.5.3 Records	Establish and maintain procedures for the identification, maintenance and disposition of environmental records, these shall include training records and results of audits and reviews. Records shall be legible and traceable to the activity involved. Records shall be stored and maintained so that they are readily retrievable and protected from loss, theft or damage. Establish and record their retention times. Maintain records as appropriate to demonstrate conformance to the Standard.	• Industry will need to incorporate records into existing systems like computer software programs.
4.5.4 Environmental management system audit	Establish and maintain procedures and programs for periodic EMS audits in order to: • Determine whether the EMS: i. Conforms to the standard. ii. Has been properly implemented and maintained. • Provide results of audits to management. Audit program shall be based on the significance of the activity and the results of previous audits. The audit procedures shall cover: • Scope. • Frequency. • Methodologies. • Responsibilities and requirements of conducting audits and reporting.	• NOTE: The audit is not on the building but rather on the Environmental Management System. BEPA's may help, however none address conformance to ISO 14001. • Audits and reports of this nature are not typical within this industry sector. Experience / knowledge will need to be transferred. • Yearly audits of the EMS are critical. Currently, some within the industry carry out various audits: for example, energy consumption and financial audits. This skill set can be transferred to an EMS.

4. 6 Management review		
4.6 Management review	Top management shall, at intervals it determines, review the EMS. All pertinent information shall be supplied to management to enable them to do the review. Document the review. Management shall address the possible need for changes to the policy, objectives or other EMS elements in light of audit results, changing circumstances and continual improvement.	• The owner or CEO along with the portfolio/property/building managers and other relevant management will need to set aside 1-2 meetings a year to review the EMS. • Industry is well equipped to document the review through traditional means. • Carrying out change/action items is also familiar to industry. • Management review issues are not typically done within industry as it has a cost and time factor. Typically, management feels vulnerable and dislikes this item as it calls to question their performance. • Great benefits can be realized through the continual improvement process.

6.0 DEFINING THE ROLE OF ISO 14001 IN RESIDENTIAL BUILDING MANAGEMENT

6.1 ISO 14001: An Ongoing Commitment

In order to define the role of ISO 14001in residential building management, it is critical to understand that the standard is used to monitor and direct environmental performance on an ongoing basis. In new buildings, environmental issues can, and often are, addressed at the design and construction stage. Older buildings can be, and often are, retrofitted to make them more comfortable and attractive, and improve their energy efficiency.

It is tempting to believe that once the construction or renovation of a building is complete, the environmental issues associated with the building disappear. Yet even buildings built to the most stringent environmental criteria can benefit from a system that keeps them on track in terms of their continual performance. Buildings are not static objects. They require day-to-day maintenance. They change physically as they age, and need renovating and retrofitting in order to replace worn parts, to adapt them to new needs, and to update them aesthetically. Mechanical and electrical systems need to be maintained to keep them working efficiently and well. Buildings and their occupants consume energy and produce waste. Although the initial condition of a building plays a major role in determining how well it performs environmentally, the day-to-day activities involved in building management determine whether this stays the same, improves or worsens.

Figure 8 illustrates the fact that over its life span, the ongoing operation of a building consumes much more energy than its initial construction.

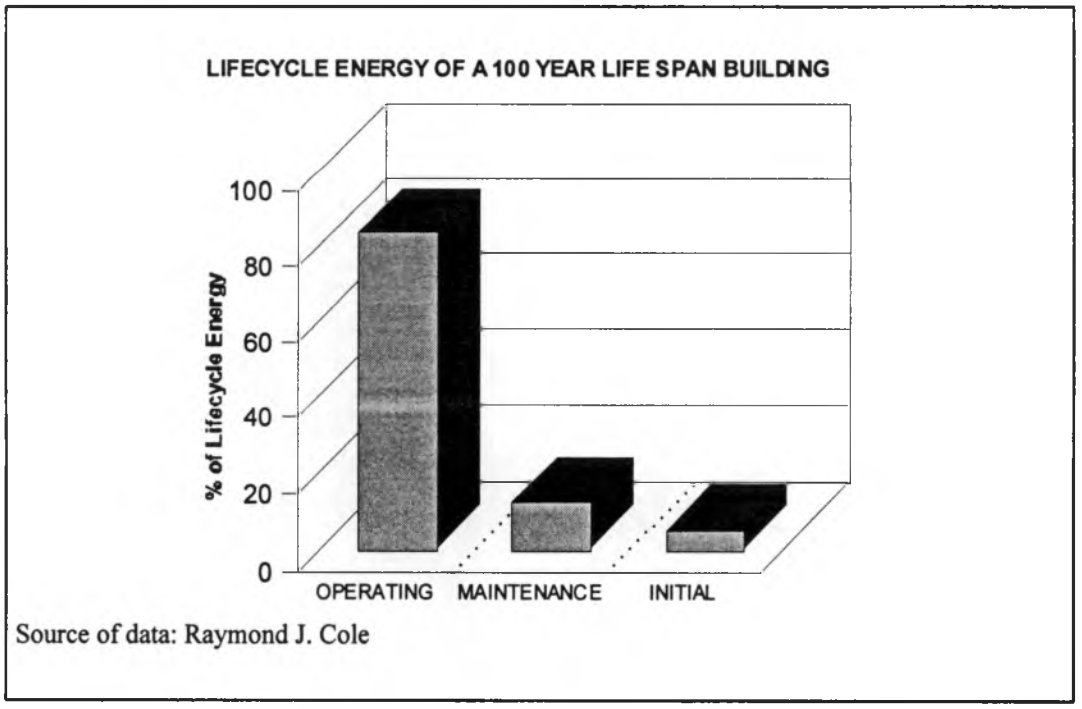


Figure 8: Comparative Energy Use During the Lifecycle of a Building

6.2 Implementation of ISO 14001

No matter what form of management system is used, or what size or number of buildings are involved, the decision to conform to ISO 14001 must come from top management, and be supported by the actions of various levels of management. Although the standard is generic in nature, it is designed to be customized for use by each individual organization.

In residential property management, there are two ways in which ISO 14001 could be implemented. The standard could be used to develop an EMS for use in the context of a specific building. It could also be use to define an EMS for property management company, which would be implemented in every property managed by that company. In order to define the role of the standard in a specific building or organization, the environmental aspects associated with the building or buildings managed by the organization must first be defined. Then the structure of the organization must be examined, and responsibilities for each of the issues must be delegated to the appropriate level of management.

6.2.1 Case Study: Canterra Tower

Canterra Tower provides a living example of a building that has adopted the ISO 14001 standard. As of September 1999, Canterra Tower was the only North American building to be registered under ISO 14001. Although Canterra Tower is not a residential building, its success provides evidence that ISO 14001 can play a positive role in building management, and its importance in the management of a relatively new building.

Commissioned in 1989, Canterra Tower is a 46-floor office tower located in Calgary. ISO 14001 was implemented as part of a ten-year strategy to improve the building's performance and reduce its operating costs.

Some of the benefits reaped by Canterra Tower as a result of its environmental initiatives are:
Reduction of energy consumption by 31%;
Better than acceptable indoor air quality was maintained, despite the increase in energy efficiency;
Reduction of solid waste sent to the Calgary landfill by 62%, resulting in hauling cost savings of $44,000 Canadian in 1998. This was accomplished through recycling and tenant education.[80]

Since ISO 14001 is still very new to Canterra Tower, its current success is just the beginning of the story. Only time will tell whether or not the EMS will continue to be effective over a long period of time.

6.3 The Five Key Elements of ISO 14001

The five key elements of ISO 14001 help define how the standard can be implemented in residential building management:

1. An environmental policy, in which the organization states its intentions and commitment to environmental legislative and regulatory compliance, the prevention of pollution and continual improvement.

- Commitment to ISO 14001 is established by the building owner and senior management.

2. Planning, in which the organization analyses the environmental impact of its operations.

- Depending on the individual building, some of its environmental aspects will be more of a concern than others. Once an initial assessment of these aspects has been done, it is up to the building

management to prioritize these issues and formulate a plan, within the scope of a realistic budget, and with the understanding of its limitations, of how it is going to reduce the amount of pollution it produces.

- Building environmental performance assessment tools (BEPA) such as those described in Section 2.6 may have a justified role to play in satisfying this component of the ISO 14001 specifications. While building environmental performance assessment tools often fail to offer solutions, their results are helpful in assessing a building's environmental impact and also in defining environmental objectives. Table 3 outlines the opportunities and barriers associated with the use of BEPAs in the implementation of an EMS.

Table 3: The Potential Role of BEPAs in the Implementation of ISO 14001

BUILDING ENVIRONMENTAL PERFORMANCE ASSESSMENT PROGRAMS	Opportunities	Barriers
BREEAM	➢ Widely used international system for assessing a building's environmental performance in terms of energy, environmental impact, indoor air quality, operation and management. ➢ Useful for management audits. ➢ Highlights areas of concern. ➢ Offers practical solutions.	➢ Does not cover issues that have not received universal scientific agreement.
BEPAC	➢ Addresses building management and tenancy management as well as building design. ➢ Useful for management audits. ➢ Covers wide range of environmental issues. ➢ Useful for monitoring and measurement.	➢ System is designed for office buildings. ➢ Does not offer suggestions. ➢ Only assesses a building's performance above legislative standards.
LEED	➢ Developed for commercial, institutional and high-rise residential buildings. ➢ Highly detailed list of environmental criteria. ➢ Useful for monitoring and measurement.	➢ Does not offer suggestions. ➢ Does not assess a building's management.
GBTool	➢ Highly detailed list of environmental criteria. ➢ Useful for monitoring and measurement.	➢ Does not offer suggestions. ➢ Does not assess a building's management.

Table 3: The Potential Role of BEPAs in the Implementation of ISO 14001		
ESM	➢ System can be used to evaluate a building's performance through an environmental audit and a database used to process the data and generate a report. ➢ The report leads to a proposal for measures that can be built into the management plan of the building. ➢ Useful for monitoring and measurement.	➢ Major focus is on the indoor environment, with less attention paid to energy consumption.
R-2000	➢ The R-2000 is an assurance of quality, particularly in energy efficiency and indoor air quality. ➢ A few environmental aspects of construction material and methods are also included in the program.	➢ Useful mainly at the design and construction stage. ➢ Does not deal with all environmental aspects. ➢ Does not assess ongoing performance. ➢ Does no assess building management-more construction oriented ➢ Designed for use in the construction of smaller, mainly wood-frame structures.

3. Implementation and operation: the development and putting into practice of processes that will bring about environmental goals and objectives.

➢ Once the initial assessment of environmental impacts has been conducted and its areas of strength and weakness have been identified, goals must be set in order to achieve continual improvement. Goals for improvement must be realistic in terms of logistics, time, effort, and economics.

➢ It is very important to recognize that under ISO 14001, goals for improvement are set by the individual organization, according to its areas of need and its economic capabilities. An organization cannot be held responsible for improvement in areas where it has no direct control; however, if an indirect aspect is significant, such as tenant behaviour, they are responsible for trying to influence it - for example, by providing opportunities for participation and through communication. It may also be possible to turn tenant participation into a direct aspect by controlling it through contractual agreements such as a clause in a lease.

➢ Implementation of the EMS demands co-operation from all appropriate participants in the building's management that are involved, directly or indirectly, with the areas needing attention. The responsibility for each goal, and the actions necessary for its achievement must be delegated to the right person and level of management. For example, if one of the goals were to be the improvement of lighting efficiency in public areas of the building, the responsibility of choosing new fixtures and hiring an electrician might be delegated to the manager who looks after hiring trades for renovations. The manager responsible for ordering supplies might be given the job of ordering the appropriate, energy-efficient replacement bulbs. The superintendent might be responsible for installing the new bulbs in the appropriate fixtures when they burn out. Superintendents might also be made responsible

for turning out unnecessary lights during daylight hours, or an electrician may be hired to install sensors that automatically turn off lights when daylight is providing enough illumination.

4. Checking and corrective action: monitoring and measurement of environmental indicators to ensure that goals and objectives are being met.

- Ongoing performance assessments are essential to fulfil the requirement of continual improvement. The use of management software that can track energy consumption and record other indicators of environmental performance will simplify this operation. BEPAs can also be used help to assess progress.

5. Management review: review of the EMS by the organization's top management to ensure its continuing suitability, adequacy and effectiveness.

- A regular review of the whole EMS, with suggestions for its improvement, will ensure that the system is functioning as planned. It will also ensure that the EMS is being updated to meet the changing needs of the building and its management.

7.0 CONCLUSION

7.1 The Need for Environmental Management Systems

The condition of our natural environment continues to be a major world issue. As it has been outlined in this report, buildings and the way in which they are operated have a significant effect on the environment. Environmental aspects of a building range from localized issues such as indoor air quality to the global problems of over-consumption of resources, greenhouse gas production and ozone depletion.

Residential building management affects the environment through:

- The selection of construction materials and methods in new residential construction projects, and in the maintenance and retrofit of existing buildings.
- The type, efficiency and condition of building envelopes,
- The type, efficiency and condition of mechanical and electrical systems.
- Chemicals used in cleaning and landscaping.
- The experience and co-operation of the building managers,
- The lifestyle of tenants.

Any of these environmental issues and effects can be handled on an individual basis and, to a large extent, this is what is currently being done. Energy efficiency has been a major focus of building construction and maintenance over the past several decades, and the efforts made to improve in this area should be commended.

But is this enough? Once a building has achieved a higher level of energy efficiency, what next? Can we relax into complacency, believing that we have done our part? We need to take a look at the big picture, and develop a holistic approach to dealing with the environmental impact of buildings through their entire life cycle.

The only way to ensure that we stay on track in our effort to address these problems is to commit to a continual effort to improve our performance. Individual performance assessments and one-time retrofit projects aimed at improving environmental performance help, but are not necessarily focused on the big picture of what can be done. This is the advantage of employing a system such as ISO 14001, which demands a commitment to continual improvement. Internationally, there is growing acceptance of the need for organizations of all kinds to adopt the ISO 14001 standard. Canadian businesses are following. Our survey results found that although the idea of introducing ISO 14001 into residential building management is a relatively new idea, there is positive interest.

7.2 Opportunities and Barriers

The future implementation of ISO 14001 in residential property management will be shaped by the opportunities it provides to the industry, and the barriers that must be overcome in order for it to gain acceptance. Its relevance will also depend on the scale of the property owner and management company and its portfolio.

7.2.1 Opportunities

ISO 14001 may provide the residential property management industry with opportunities to realize environmental, social, health and economic benefits. It may also be of assistance in managing legal and business affairs. Some potential areas of opportunity are:

Sustainable Development and Environmental Performance
Embedded within the ISO 14000 series of standards is the notion of sustainable development: development that meets the needs of the present without compromising the needs of the future. Creating a standardized and internationally accepted process for reducing environmental impacts will ensure that sustainable development is being considered in the future management and maintenance of multi-unit residential housing. The ISO 14001 standard requires a pro-active approach to reducing environmental impacts rather than a reactive one. Adopting this method will not only contribute to the prevention of pollution, but will also raise awareness and involvement in the residential management and environmental industry.

People with Differing Needs
CMHC has recognized the special housing needs of individuals with environmental hypersensitivity (EH) for years. These individuals often suffer partial or total debilitation when exposed to poor indoor air quality environments. To reduce health risks, EH individuals require an environment as free as possible from air-borne pollutants. Though each individual reacts to a different mix of pollutants, the cleanliness of the air achieved through the management of the indoor environment (which would be included in an EMS) can effectively meet the indoor air quality needs of the majority of people affected by EH.

Promotes Voluntary Standards
As alternatives to the traditional command and control model, voluntary environmental standards provide support for governments to comply with international obligations concerning environmental protection and management issues. These standards have the potential to reduce the government's burden of creating and enforcing regulations, as the cost of both development and conformity assessment falls on the private sector.[81] If self-regulation is widely practiced within an industry, the need for additional legislation may be reduced, resulting in greater freedom of choice of how compliance is to be achieved.

Housing in the National and International Economy
Companies wishing to pursue property management contracts abroad may find ISO 14001 compliance beneficial in order to demonstrate their environmental responsibility on a recognized, international level. As international environmental standards become more and more stringent, this is likely to become increasingly important in order to gain an international reputation. By utilizing an EMS through the International Organization for Standardization (ISO), the system will be transferable and accepted both nationally and internationally. This process will lead to the harmonization of national rules, labels, and methods and help to minimize trade barriers and related complications. Using the certification of an International standard such as ISO 14001 may give a property management company a competitive advantage in the international and national market places. Once accredited, a company would seemingly have a more favorable lending status and consequently, better access to capital. Accreditation may also promote the company as an attractive partner to other real estate management companies in foreign countries.

Building Performance and Technical Innovation
This research is the first step in producing an internationally recognized and accepted EMS for residential building management. Such a system has the potential to help protect human health and the environment from the potential impacts of building management activities, products or services. An EMS may enable building owners and managers to greatly improve building performance and increase the life span of building components through implementation of a pro-active system. The system will provide order and consistency to address environmental concerns through the allocation of resources, assignment of responsibilities, and on-going evaluation of practices, procedures and processes.

Housing Affordability
An EMS can be considered an investment towards improving business performance by effectively meeting regulations and other requirements and efficiently minimizing wasted time, equipment and

materials. Such systems often have a significant positive impact on the bottom line of a business. An effective EMS may not only help to avoid expensive remediation costs, but it could also make an important contribution to the economic performance of the building. For instance, reducing energy consumption, improving process efficiency, and reducing waste generation (and therefore waste disposal costs) could translate into a reduction in rental and/or maintenance costs for owners and tenants.

Legislation and Regulation Compliance
The adoption of ISO 14000 will lead to a more effective management of regulatory compliance. An EMS would facilitate a company's ability to ensure its compliance to existing regulations, and to respond to changes in environmental legislation affecting residential building management. Ideally, adoption of the standard would encourage building managers to move beyond compliance in a more pro-active capacity. Since ISO 14000 would effectively establish a company's credibility when facing violations, one direct benefit is a reduction in the potential liabilities from environmental incidents. This benefit may result in lower insurance premiums, since liability would be reduced.

Internal Management Efficiency
The framework of the standard requires that effective communication channels are established and maintained. This can result in a potential for company productivity to grow by increasing employee involvement and improving internal management methods.

Public Image
The adoption of the ISO 14001 standard will assure clients, supplier, tenants, and government bodies that a specific company has established and is maintaining an environmental management system. By promoting predictability and consistency throughout its properties, a management company develops a positive reputation as a responsible manager. This reputation is marketable as an assurance that investor or tenants expectations will be met and their criteria satisfied. It may also create an opportunity for the creation of REITs that concentrate on high-performance buildings as a market niche.

ISO 14001 certification could also help to maintain good public and community relations as well as improved relations with government departments. Consequently, this may facilitate the ease of attaining certain permits and authorisations. Since ISO 14001 is voluntary, adoption of the standard would demonstrate an organization's environmental commitment and sense of responsibility, this would result in a competitive advantage over non-certified competition.

Meeting Vendor Certification Criteria
As other industries undergo the ISO certification process, it will become increasingly important for the suppliers of products and services to those organizations to also be ISO certified. This may be more of an issue in commercial property management, where ISO 14001 certified businesses may prefer to rent space in certified buildings. However, as public knowledge and acceptance of ISO 14001 grows, compliance may be a selling feature for residential tenants who wish to live in buildings whose management demonstrates concern for environmental issues.

7.2.2 Barriers

Some of the barriers to the acceptance of the ISO 14001 standard within residential building management are:

Lack of Awareness
One of the greatest barriers to implementation of the standard is lack of awareness on the part of the industry. Survey results showed that while there appears to be some interest in the standard within the residential property management industry, many participants were not aware that it existed.

Time and Effort
Whether or not an organization already has an established management system, adopting the ISO 14001 standard will require time and effort to set up, and a commitment to ongoing efforts to maintain.

Documentation
Although ISO 14001 does not specifically require written documentation, a company with no formal management program in place may find it difficult to embrace EMS, and to effectively monitor its environmental impacts and implement corrective measures. In addition, it would be very difficult to adhere to the requirements of continual improvement without some method of documentation. This may be most problematic for smaller and medium sized companies, which tend to use less written documentation than larger corporations. Although it is by keeping track of performance and progress that real efficiencies and savings can be achieved., people who have little or no direct experience with document control may not see the benefit of extra documentation.

Additional Training Requirements
In addition to the effort required to keep records and maintain documentation, resources will be required to provide initial and on-going training to employees in order to keep their skills and knowledge up-to-date.

Expense
Although increased efficiency brought about by ISO 14001 compliance may result in long-term cost savings, small and medium sized organizations or individual property owners may find the initial cash outlay required for certification to be too expensive. Financial investment is also required to pay the salaries of employees and outside consultants working on establishing and implementing the EMS. Managers of properties owned by REITs may be reluctant to spend money on behalf of investors who are indifferent to the quality of management in favour of quick profit.

Suppliers and Contractors
One aspect of the implementation of an EMS is the procurement of supplies and services from businesses that can also demonstrate their involvement in environmental stewardship. In some regions it may be difficult to find suppliers and contractors who are ISO 14001 certified, or have other means of documenting their adherence to environmental principles.

Public Scrutiny
ISO 14001 requires that a company's environmental policy be made available to the public. In the business world particularly, company policies are restricted information and are not generally made widely available.

Marketability
Within the residential property management industry, skepticism regarding the value and practicality of ISO 14001 may make it difficult to promote compliance and convince people of its marketability.

Credibility
ISO 14001 requires a commitment to action, but does not prescribe performance levels. Since it does not assure a specific level of quality, it may lack credibility.

Generic Nature of the Standard
Since ISO 14001 is a generic standard, the residential property management industry may have a difficult time using it. They may prefer a system designed to meet the needs of their specific industry.

Need for Information and Assistance
Property management companies that may be interested in pursuing ISO 14001 certification may find it difficult to do so unless information and assistance are readily available for them.

Lack of Knowledge of Environmental Impacts and Aspects
Most participants in the residential property management industry do not have enough knowledge and experience to develop environmental programs. It will be difficult for these people to make informed decisions on environmental issues. Technically qualified people may be needed on a full-time basis to manage environmental affairs.

Lack of Protocol
Although tests exist for some aspects of a building's environmental performance, there is no protocol for testing other aspects of environmental management systems. Without standardized methods of testing, it may be difficult to monitor whether or not the environmental management system is continually improving.

7.3 ISO 14001 and Current Residential Building Management Policies

Over the years, many types of management arrangements for MURBs have been developed or altered according to specific needs and differing circumstances. Organizations model their systems and policies on frameworks established by government legislation, regulations, guidelines and by-laws, codes of ethics from associations, and manuals or reference guides. Systems are modified by years of experience and by trial and error. As the level of development varies from one company to another, an immense range of sophistication and organization exists between and within different groups. It is clear that there is currently no standardized methodology for managing multi-unit residential properties.

Since residential property management systems are not uniform in their approach or structure, it may be difficult to implement ISO 14001 in a standardized way throughout the industry. Industry-specific guidelines or recommendations for the use of the standard will need to be detailed enough to meet the needs of the industry, yet flexible enough to accommodate all its variations.

7.4 Legal Aspects of Property Management and the Environment

Many aspects of building construction, renovation, management and use have significant environmental repercussions. Preventative maintenance programs and systems may help to minimize a building's environmental impact. Some aspects of building management and maintenance are regulated but, for the most part, maintenance systems are developed and used at the discretion of the owner and building manager. Through preliminary research, it has been observed that as diligent as the residential building management industry is, environmental legislation is not being effectively integrated into practice.

The residential building management industry must adhere to a number of regulations and legislation, and it is becoming increasingly difficult to monitor all the changes. There does not currently seem to be any effective system in place that will facilitate the transfer of knowledge of new environmental legislation pertaining to residential building management. For example, the Fire Code and the National Building Code, as well as Provincial Building Codes, are updated and re-issued every five to eight years, but it is the responsibility of the property managers to obtain the new editions and to apply any new codes.

In addition to these observations, it has been noted that residential building managers mentally prioritize legislation and regulations according to their severity and potential repercussions. Since the Fire Code is widely and strictly enforced, it usually receives top billing. Consequently, certain non-enforced regulations may not receive the same attention.

Ideally, a property management company should have well-structured, well-documented procedures and policy manuals, which include provisions for keeping up with legislative change. An environmental management system could form part of an overall management plan. ISO 14001 compliance benefits an organization by ensuring that it has policies to keep abreast of legislative changes, and to comply with the changes. It has also gained credibility within the court system as means of demonstrating environmental due diligence.

7.5 Tenant Participation

Skeptics have pointed out that it may be difficult to achieve tenant co-operation in the implementation of an EMS, and that some tenants may actually resent having an environmental management system imposed upon them. Although this may be a valid concern, it could be argued that by adopting the standard, the management of a residential building can improve those aspects of the building over which it does have control, such as the physical condition of the building, its systems and its maintenance practices. ISO 14001 requires that action be taken on significant environmental aspects that can be controlled and influenced. Tenant participation may be considered a significant indirect aspect, since without contractual agreement, it can be influenced, but not controlled. In order to encourage tenant participation, it may be desirable to include in a lease or, in the case of co-operatives or condominiums, purchase agreements, some type of incentive or regulation addressing how units are operated.

Depending on the circumstances, an environmental management system may have a positive impact on the lives of the tenants – especially if increased energy efficiency is passed on to them in terms of cost savings. Other improvements made as a result of ISO 14001, particularly those concerned with indoor air quality, may contribute to improved health and well-being of residential building tenants. Many tenants would be pleased to know that their building managers are taking initiatives in environmental stewardship. Condominium owners, co-operative members or tenant groups wishing to convince their landlords to improve the environmental performance of their buildings in order to lower utility costs, improve the quality of life in the building and be environmentally responsible could conceivably request that the property be managed according to an ISO 14001 EMS.

By introducing the system gradually, and with the input of tenants, perhaps by having tenant representatives on environmental committees, there is likely to be more co-operation and involvement on the part of the tenants. Through the adoption of an environmental management system, there is potential to create a climate of environmental consciousness within a residential building. Tenant associations could potentially act as initiators of the adoption of an EMS.

Tenant participation is likely to be more positive in buildings where tenants stand to benefit directly from an EMS; if, for example, they are responsible for paying for their own utilities, tenants are likely to welcome changes that would make their buildings more energy efficient, effectively lowering their utility bills. A building management arrangement that already encourages tenant participation, such as a co-operative, may find it easier to gain support for the implementation of an EMS, since the changes would be made for the benefit the whole community.

Tenants may have other concerns about how an EMS will affect them. For example, condominium owners may be concerned about how an ISO 14001 registration will affect their condominium fees, and whether it will have an impact on the resale value of their property.

8.0 RECOMMENDATIONS

8.1 Education

Lack of awareness is perhaps the greatest barrier to the acceptance of ISO 14001 in residential property management. For this reason, it is recommended that the building management industry be introduced to the standard. Conferences may provide an introduction to the theoretical aspects of ISO 14001. Workshops for building owners and managers may provide a more practical, step-by-step approach to how the standard could be implemented. Association newsletters may be used as a means of communication with people in the industry. Once ISO 14001 has gained a credible role within residential property management, the media and the Internet may also be valuable in the dissemination of information.

8.2 Government Incentives

As documented in Section 4, the Ontario Ministry of the Environment has established goals for the wider implementation of ISO 14001 in Ontario. It is recommended that further government initiatives be initiated to encourage the use of ISO 14001 in the residential sector. These initiatives could be structured as joint efforts between various government ministries, such as housing and the environment.

Government departments wishing to encourage Canadian companies to pursue contracts outside of Canada could also be approached to provide support for property management companies to implement ISO 14001 in order to help them gain distinct credibility on an international level. This may help Canadian property management firms to carve out a niche for themselves in the international market.

Governments can provide incentives to the use of ISO 14001 by:

- Making reference to the standard in regulations, codes and standards as a means of demonstrating environmental due diligence.
- Allowing self-monitoring of organizations that use ISO 14001 compliance as a means of demonstrating their commitment to prevention of pollution and continual improvement, with the expectation that they can be trusted to act appropriately if problems occur.
- Offering programs to help property managers or management groups determine whether or not ISO 14001 would be beneficial to their organization.
- Making it easier for organizations to be able to afford the expense of implementing an EMS. This may be accomplished through extra tax deductions, access to interest-free or low-interest loans, or direct funding contributions.

8.3 Unregistered Participation or Alternative Recognition

If the cost of registering a building or property management group under ISO 14001 is prohibitive, and if international recognition is not a high priority, it is recommended that the standard be used as a framework for developing an unregistered, yet effective EMS. It may be beneficial for a neutral, third-party organization such as CMHC or an industry association to monitor residential properties using an ISO 14001-based EMS, and grant them recognition for their efforts. An example of this in a related industry is the Green Leaf Certification program for hotels, initiated by the Board of Environment Promotion of Tourism Activities (BEPTA). This program grants a rating of one to five "leaves" in recognition of their effort for environmental development and protection, and lists the certified hotels in a Green Hotels Directory, which is distributed to travel agencies worldwide.[82]

8.4 Recommendations for Implementation

8.4.1 Gradual Implementation

If a residential building management organization decides to adopt the ISO 14001 standard, the implementation should be done gradually, but as efficiently as possible, with a detailed plan, set of objectives and operating budget. One option for a building management organization is to first register the management headquarters, and then to parachute the EMS to individual buildings under management, one at a time. This would allow the company to experiment with the standard on a smaller scale before committing all of its management properties. The scope of registration would clearly define which buildings have an EMS, and an individual EMS could be designed for each building to meet the needs of its unique significant environmental aspects.

8.4.2 Non-Exhaustive Approach

It is important to develop a simple, non-exhaustive approach to the implementation of an EMS. By integrating the standard with existing management systems, it will be less cumbersome.

8.4.3 Use of Existing Mechanisms

During the initial assessment, while objectives and goals are being set, it is recommended that the existing building or property management system be examined to determine whether there are already tools or mechanisms present that would assist in the development of an EMS. Management software with modules that are capable of producing maintenance records and tracking energy consumption may be particularly useful. If these are not part of the existing management system, administrators would be wise to shop around for a system that could perform both day-to-day administrative tasks and also assist in the development and implementation of an EMS.

8.4.4 Communication

Open communication between management and tenants should be part of any residential property management system. Although direction for the development of an EMS should come from the level of management that will be responsible for implementing the system, it is recommended that a tenant environmental committee be formed. A tenant environmental committee could be responsible for keeping tenants informed through meetings or newsletters, and inviting their participation and input, particularly on issues that will directly affect them. In the case of co-operatives and condominiums, this is essential.

8.5 Further Study

8.5.1 In Depth Analysis

Finally, it is recommended that this topic be examined in greater detail, in order to suggest more specific ways in which an ISO 14001 EMS can be effectively integrated into residential property management. This study attempts to introduce the topic, but more in-depth analysis will be required.

8.5.2 Focus Groups

The study should involve input from focus groups made up of people from all levels of the residential property management industry. This would include property owners and managers, building managers and superintendents, members of condominium, co-operative and non-profit housing boards of directors, and members of tenants' associations. These people could provide valuable insight from within the property management industry on the implementation of ISO 14001. Their direct experience in residential

property management may enable them to point out more benefits and barriers to the implementation of ISO 14001, and make suggestions to how the standard could best be adapted for use in their industry.

8.5.3 Pilot Projects

In order to get a first-hand look at how ISO 14001 will affect residential property management, it is recommended that pilot projects be initiated to study and document the performance of ISO 14001 in a multi-unit residential application. Ideally, this study would include participants engaged in the various forms of for-profit and non-profit housing. In order to address regional variables, it would also be beneficial to involve participants from all regions of the country. If the funding for this type of project were limited, it would be most beneficial to begin the study by focusing on systems that already have active tenant participation in the building management, such as co-operatives or condominiums.

8.5.4 Development of Guidelines

It is recommended that guidelines for implementing ISO 14001 in residential building management be developed. This would be an indispensable tool for organizations in this industry wishing to pursue registration. The culmination of additional research could be the development of an ISO 14001 manual specifically geared to the residential industry, including simple, straightforward template documents. This resource would make it easier for property management organizations to visualize how the standard could be implemented into their management policy, and provide practical information and advice for groups wishing to pursue the development of an EMS.

Glossary of Terms

For the purpose of this report, the following definitions, adopted from the ISO 14001 Standard, apply:

Environment: surrounding in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interaction.

Environmental Aspect: element of an organization's activities, products or services that can interact with the environment

Environmental Impact: any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.

Environmental Policy: statement by the organization of its intentions and principles in relation to its overall environmental performance which provides the framework for action and the setting of its environmental objectives and targets.

Environmental Management System: the part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy.

Sustainable development: development that meets the needs of the present without compromising the needs of the future.[83]

LIST OF ACROMYMS

ACMO	Association of Condominium Managers of Ontario
BCSD	Business Council for Sustainable Development
BEPA	Building Environmental Assessment Program
BEPAC	Building Environmental Performance Assessment Criteria
BEPTA	Board of Environment Promotion in Tourism Activities
BOMA	The Building Owners and Managers Association
BOMI	The Building Owners and Managers Institute
BREEAM	Building Research Establishment Environmental Assessment Method
CCI	Canadian Condominium Institute
CCOC	Centretown Citizens Ottawa Corporation
CHF Canada	Co-operative Housing Federation of Canada
CMHC	Canada Mortgage and Housing Corporation
CSA	Canadian Standards Association
EH	Environmental hypersensitivity
EMI	Environmental Management Institute
ESM	Environmental Status Model
GBC	Green Building Challenge
GBTool	Green Building Tool
EMS	Environmental Management System
HVAC	Heating, Ventilating and Air Conditioning
IC&I	industrial, commercial and institutional
IEC	International Electrotechnical Commission
ISO	The International Organization for Standardization
LEED	Leadership in Energy and Environmental Design
MOE	Ontario Ministry of the Environment
MURB	Multi-Unit Residential Building
NARPM	The National Association of Residential Property Managers
NGO	Non-Governmental Organization
OMMAH	Ontario Ministry of Municipal Affairs and Housing
REIT	Real Estate Investment Trust
SAGE	Strategic Advisory Group on the Environment
TPA	Ontario Tenant Protection Act
UNCED	United Nation Conference on Environment and Development
UNEP	United National Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
WCED	World Commission on Environment and Development

BIBLIOGRAPHY

Publications

The Auditorial, Newsletter of the Canadian Environmental Auditing Association, Fall 1999.

BOMI. Fundamentals of Real Property Administration. 1993.

BOMI. Commercial Property Professional Education Catalog.

Brown, Lester Russel. Vital Signs: The Trends that are Shaping our Future. Worldwatch Institute: New York. 1996.

Canadian Property Management Magazine. "Who's Who in the Canadian Property Management Industry". February/March 1999.

Catalli, Vince and Bartlett, Ian. Resource Efficient Specification Handbook. By dEsign consultanats and Spec Masters & Associates.

Centretown Citizens Ottawa Corporation. CCOC Board Briefing Book. 1998-1999.

CMHC and Efficiency Engineering Inc. Manual 1: An Operating Manual for Owners and Managers. Canadian Mortgage and Housing Corporation. 1997.

CMHC. Manual 2: An Operating Manual for Maintenance and Custodial Staff. 1997.

CMHC. "Building materials for the environmentally hypersensitive". 1995.

CMHC. "Inspection checklist for maintenance and repair". 1994.

CMHC. "The clean air guide: How to identify and correct indoor air problems in your home". 1993.

CMHC. "Clean-up procedures for mold in houses". 1993.

CMHC. "Investigating, diagnosing and treating your damp basement". 1992.

CMHC. "Ventilation: Health and safety issues". 1986.

Environmental Research Group, School of Architecture, University of British Columbia BEPAC - Building Environmental Assessment Criteria. 1993.

Forbes, Stephen . Environmental Compliance and Management Benefits . Forbes Environmental Engineering .Online: September 13, 1997.

Glaumann, Mauritz. Green Building Challenge '98 Conference Proceedings, Volume 1. "Environmental Assessment of Buildings – The CBE Version". Ministry of Supply and Services Canada. 1998.

Haklik, James E. April 2, 1997. ISO 14000 Environmental Management: Benefiting Companies, Saving the Environment . Online: September 13, 1997.

Haklik, James E. July 28, 1997. Benefiting from Pollution Prevention . Transformation Strategies . Online: September 13, 1997.

Haklik, James E. August 20, 1997. . ISO 14001 and Sustainable Development . Transformation Strategies . Online: September 13, 1997.

Interiors & Sources Magazine. "Trouble in the Air". BPA Publishing: New York. April 1995.

International Organization for Standardization. March 1997. The ISO 14000 Environment: ISO Environmental Management System Standards.

International Organization for Standardization. March 2, 1997. Publicizing your ISO 9000 or ISO 14000 certificate.

International Organization for Standardization. ISO 14001, Environmental management systems – Specification with guidance for use. 1996.

Ministry of Municipal Affairs and Housing. Tenant Protection Act 198/98. Maintenance Standards O. Reg. 198/98, Part VI – General Maintenance. Section 39. 1997.

Natural Resources Canada. Green Building Challenge '98 Conference Proceedings, Volumes 1 and 2. 1998.

Ontario Home Builder's Association. Ontario R-2000 Home Program Technical Requirements. January 1996/ July 1997

Public Works and Government Services Canada (1997) . An Architect's Guide for Sustainable Design of Office Buildings: Health and Well-Being.

Rees, William and Wackernagel, Mathis. Our Ecological Footprint: Reducing Human Impact on the Earth. New Society Publishing. 1995.

Reimer, John. Environmentally Responsible Procurement. 1998.

Reimer, John. Waste Management Under ISO 14001.

Rostum, Hussein; NGL Nordicity Group Ltd. September, 1994. ISO 9000 and the Residential Construction Industry.

Standards Council of Canada. March 4, 1997. What is ISO 14000? ... Questions and Answers

Statistics Canada. GDP By Industry.

Statutes of Ontario: The Occupational Health and Safety Act.

SGS International Certification Services Canada Inc. ISO 14001 Lead Auditor Training Course Manual. 1998.

U.S. Green Building Council's Leadership in Energy and Environmental Design Green Building Rating System (LEED).

Wilson, Kevin. April 4, 1997. Benefits of Environmental Management and ISO 14000 . Carter Holt Harvey Tissue. Online: September 13, 1997.

Zeiher, Laura. The Ecology of Architecture. Whitney Library of Design: New York. 1996.

Internet Sources

1999 National Association of Residential Property Managers. 1999. *http://www.narpm.org/history.html*. (July 22, 1999).

Altoft, Katie. "ISO 14000 / ISO9000 Hand-in-Hand: Q & A on Compatibility" and "Compatibility front and center for international environmental and quality management: Joint Task Group confronts compatibility", Environmental Update - Winter 1998/99, CSA International Web Site, *http://www.csa-international.org/english/home/index.htm*, (July 28, 1999).

ANSI (American National Standards Institute). "What is the ISO 14000 Series of Standards?" Feb 2, 1998. http://web.ansi.org/public/iso14000/faq/faq_a.html. (July 26, 1999).

Alberta Home Builders Association. "The "New" R-2000 Home". *www.alberta-homes.com/R_2000.html*. (July 15,1999).

Angus Systems Group Ltd. Web Site. http://www.angus-group.com, (November 28,1999).

BB&C Association Management Services Web Site. http://www.bbandc.com.clients/html, (Nov. 12, 1999).

Canada Law Book Web Site. http://www.canadalawbook.ca, (December 7, 1999)

Canadian Condominium Institute. http://www.cci.ca. (December 8, 1999).

BOMA Toronto Web Site. http://www.bomatoronto.org/about/mission.asp, (December 8, 1999).

Canadian Condominium Institute, Golden Horseshoe Chapter. http://www.freenet.hamilton.on.ca/Information/law/condos/page1.html. (December 8, 1999).

Canadian Home Builders Association Internet Site. *www.chba.ca* (July 22, 1999).

City of Toronto. 1998. *http://www.city.toronto.on.ca/depts/commserv_cityhome.htm* (July 23, 1999).

The Co-operative Housing Federation of Canada Internet Site. http://www.chfc.ca. (December 8, 1999).

DataTrust Inc. Web Site, http://www.datatrust.net/software.html. (November 18, 1999).

Fluor Corporation Web Site. http://www.tabware.com, (November 18, 1999).

Globus Registry Web Site. http://www.globusregistry.com, (December 4, 1999).

Health Canada Website. http://www.hc-sc.gc.ca, (July, 1999).

J.D. Edwards Enterprise Software Web Site. http://www.jdedwards.com. (November 28,1999).

International Co-operative Alliance (ICA) Web Site. http://www.coop.org/menu/informationsite.html. (December 8, 1999).

ISO/TC 207 Committee. "Communiqué from the 7th Annual TC 207 Plenary in Seoul, Korea". ISO/TC 207 Web Site. 1999-06-06. *http://www.tc207.org/articles/index.html*, (July 28, 1999).

ISO/TC 207 Committee. "Frequently Asked Questions" ISO/TC 207 Web Site. http://www.tc207.org/faqs/index.html, (July 28, 1999).

ISO World. http://www.ecology.or.jp/isowrorld/english/analy14k.gif (December, 1999)

"Ivanhoe Corporate Profile", Ivanhoe Web Site, (July 30, 1999).

Jackson, Suzan. "ISO 14000: What you need to know about the new Environmental Standards." Environmental Laboratory Washington Report. (February 6, 1997). *http://www.lawinfo.com/law/ca/environmentallaw/archives/SuzanJackson.htm*. (July 24, 1999).

Law Offices of S. Wayne Rosenbaum. 1997. *http://www.lawinfo.com/law/ca/environmentallaw/iso.html* (July 23, 1999).

Management Practice Press, Inc.1995. *www.echo-sol.com*. (July 15,1990).

Ministry of Municipal Affairs and Housing. "Tenant Protection Act Takes Effect in Ontario." June 17,1998. *http://www.mmah.gov.on.ca/inthnews/releases/19980617e.htm*) (July 21, 1999).

1999 National Association of Residential Property Managers, 1999. (July 22, 1999).

Ontario Non Profit Housing Association. http://www.onpha.on.ca. (December 7, 1999).

Ontario Rental Housing Tribunal. "The Tenant Protection Act – overview page." Queen's Printer for Ontario. 1999 *http://www.orht.gov.on.ca/public/index.html*. (July 20, 1999).

Ontario Rental Housing Tribunal. "Interpretation of Guidelines – Breach of Maintenance Obligations." Queen's Printer for Ontario. 1999. *http://www.orht.gov.on.ca/act/guide03.html*. (July 20, 1999).

Plant Pathology Online, www.scisoc.org .

Rouke, Dennis J. "The New Spin on Management Practice". Management Practice Press Inc. 1995. www.echo-sol.com/mpp/interest.html. (July 15, 99).

Spectra Computer Services Ltd., http://www.spectra.ca. (November 12, 1999).

Standards Council of Canada, http://www.scc.ca (April 22, 1999).

Travel Asia, Dec. 11, 1998. http://www.incentives-asia.com/travel-asia/12_11_98/stories/green.htm (December 7, 1999).

Trow Consulting Engineers Ltd., http://www.trow.com. (November 18, 1999).

ENDNOTES

[1] *"The New Spin on Management Practice."* Dennis J. Rouke, 1995. (July 15, 99).

[2] *Fundamentals of Real Property Administration,* BOMI, 1993, 4th qtr. p. 2-1

[3] Statistics supplied by CMHC Marketing Analysis, current as of October 1999.

[4] City of Toronto Web Site, 1998, (July 23, 1999).

[5] *http://www.freenet.hamilton.on.ca/Information/law/condos/page1.html.* Canadian Condominium Institute, Golden Horseshoe Chapter

[6] *http://www.chfc.ca.* The Co-operative Housing Federation of Canada.

[7] *Fundamentals of Real Property Administration,* BOMI, 1993, 4th qtr. p. 3-5.

[8] Ibid. p. 3-5.

[9] Ibid. p. 2-6.

[10] Ibid. p. 2-2.

[11] Ibid. p. 5-2.

[12] *http://www.bbandc.com.clients/html.* Web Site of BB&C Association Management Services (Nov. 12, 1999)

[13] Ibid.

[14] *http://www.cci.ca.* Web Site of the Canadian Condominium Institute (December 8, 1999)

[15] *http://www.onpha.on.ca.* Web Site of ONHPA (December 7, 1999)

[16] Ibid.

[17] *http://www.bomatoronto.org/about/mission.asp* Web site of BOMA Toronto. (December 8, 1999)

[18] 1999 National Association of Residential Property Managers Web Site. 1999. (July 22, 1999).

[19] *Manual 1: An Operating Manual for Owners and Managers.* CMHC. 1997. p. 1

[20] Ibid.

[21] *http://www.canadalawbook.ca.* Web Site of Canada Law Book (December 7, 1999)

[22] *http://www.ansi.org/public/iso14000/docs/14004.html* –Web Site of The American National Standards Institute (ANSI) Dec.1, 1999.

[23] *http://www.coop.org/menu/informationsite.html* Web site of International Co-operative Alliance (ICA)

[24] *http://www.spectra.ca.* Web Site of Spectra Computer Services Ltd., November 12, 1999.

[25] *http://www.datatrust.net/software.html.* Web Site of DataTrust Inc., Nov. 18,1999.

[26] *http://www.trow.com.* Web Site of Trow Consulting Engineers, Ltd., November 18, 1999.

[27] *http://www.tabware.com.* Web Site of Fluor Corporation., November 18,1999.

[28] *http://www.angus-group.com.* Web Site of Angus Sytems Group Ltd., Nov. 28, 1999.

[29] *http://www.jdedwards.com.* Web Site of JD Edwards Enterprise Software, Nov. 28,1999.

[30] *Resource Efficient Specification Handbook.* Catalli and Bartlett. Page 2.

[31] GDP By Industry, Statistics Canada.

[32] *Vital Signs: The Trends that are Shaping our Future,* Worldwatch Institute.

[33] *Our Ecological Footprint: Reducing Human Impact on the Earth,* William Rees and Mathis Wackernagel, New Society Publishing, 1995.

[34] *Trouble in the Air,* Interiors & Sources Magazine: New York: BPA Publishing, April 1995.

[35] *The Ecology of Architecture,* Laura Zeiher, Whitney Library of Design: New York, 1996, p. 116

[36] Ibid. p. 8-9, 121

[37] Health Canada Website: *www.hc-sc.gc.ca*

[38] Health Canada Website: *www.hc-sc.gc.ca*

[39] Plant Pathology Online: *www.scisoc.org*

[40] *"Tenant Protection Act Takes Effect in Ontario",* Ministry of Municipal Affairs and Housing Web Site, 1998 (July 21, 1999)

[41] Statutes of Ontario: *The Tenant Protection Act 198/98. Section 24*

[42] Regulations of Ontario: *The Tenant Protection Act 198/98. Maintenance Standards O. Reg. 198/98 Section 39.(1)*

[43] *"The Tenant Protection Act – overview page on ORHT",* Ontario Rental Housing Tribunal Web Site, (July 20, 1999)

[44] Statutes of Ontario: *The Occupational Health and Safety Act, Section 36.(1).*

[45] *"Environmental Assessment of Buildings – The CBE Version", Green Building Challenge '98 Conference Proceedings, Volume 1,*, Mauritz Glaumann, Ministry of Supply and Services Canada, 1998, Page 47.

[46] *"BREEAM North America: Adapting a Successful Environmental Assessment Methodology to a New Context", Green Building Challenge '98 Conference Proceedings, Volume 1,* Page 204-205.

[47] *BEPAC - Building Environmental Assessment Criteria.* Environmental Research Group, School of Architecture, University of British Columbia, 1993.

[48] *Leadership in Energy and Environmental Design Green Building Rating System (LEED),* U.S. Green Building Council, Page 1-5.

[49] *"GBC '98: Context, History and Structure",* Green Building Challenge '98 Conference Proceedings, Volume 1, Page 15-22.

[50] *"Environmental Status of Buildings – A new system for the environmental auditing and assessment of buildings"*, Green Building Challenge '98 Conference Proceedings, Volume 1, Page 323-327.

[51] *"The "New" R-2000 Home"*. Alberta Home Builders Association Web Site, (July 23, 1999)

[52] *"Ontario R-2000 Home Program Technical Requirements"*, Ontario Home Builder's Association. January 1996/ July 1997, p.1

[53] *"Peace of Mind"*, Canadian Home Builders Association Web Site, (July 23, 1999)

[54] Standards Council of Canada Web Site

[55] Ibid.

[56] *ISO 14001 Environmental management systems – Specification with guidance for use.* Page vi.

[57] Ibid.

[58] *ISO Lead Auditor Training Course Manual,* SGS ICS Canada Inc, 1998.

[59] Ibid.

[60] Ibid.

[61] *"ISO 14000: What you need to know about the new Environmental Standards"*, Suzan Jackson, Environmental Laboratory Washington Report, February 6, 1997, (July 24, 1999)

[62] *"Frequently Asked Questions"*, ISO/TC 207 Web Site, (July 28, 1999)

[63] *"What is the ISO 14000 Series of Standards?"* ANSI Web Site, 1998. (July 26, 1999.)

[64] Standards Council of Canada Web Site

[65] Ibid.

[66] *"BREEAM North America: Adapting a Successful Environmental Assessment Methodology to a New Context,"* Green Building Challenge '98 Conference Proceedings, Volume 1, Page 203.

[67] *Ranking of ISO Registrations by Country.* The Auditorial, Newsletter of the Canadian Environmental Auditing Association, Fall 1999.

[68] *http://www.ecology.or.jp/isowrorld/english/analy14k.gif.*

[69] *Ontario Ministry of the Environment to Encourage EMS.* The Auditorial, Newsletter of the Canadian Environmental Auditing Association, Fall 1999.

[70] *"Ivanhoe Corporate Profile"*, Ivanhoe Web Site, (July 30, 1999)

[71] *http://www.globusregistry.com.* Web Site of the Globus Registry, (December 4, 1999)

[72] *"ISO 14000 / ISO9000 Hand-in-Hand: Q & A on Compatibility"*, Katie Altoft, Environmental Update - Winter 1998/99, CSA International Web Site, (July 28, 1999)

[73] *"Compatibility front and center for international environmental and quality management : Joint Task Group confronts compatibility"*, Katie Altoft, Environmental Update - Winter 1998/99, CSA International Web Site, (July 28, 1999)

[74] Ibid.

[75] *"Communiqué from the 7th Annual TC 207 Plenary in Seoul, Korea"*. ISO/TC 207 Web Site, 1999, (July 28, 1999)

[76] "ISO 14000 / ISO9000 Hand-in-Hand: Q & A on Compatibility", Katie Altoft, Environmental Update - Winter 1998/99, CSA International Web Site, (July 28, 1999)

[77] *"Communiqué from the 7th Annual TC 207 Plenary in Seoul, Korea"*. ISO/TC 207 Web Site, 1999, (July 28, 1999)

[78] *Big Three Endorse ISO 14001.* The Auditorial, Newsletter of the Canadian Environmental Auditing Association, Fall 1999.

[79] Ibid.

[80] Statistics obtained from Oxford Properties Group Incorporated.

[81] *"Frequently Asked Questions"*, ISO/TC 207 Web Site, (July 28, 1999)

[82] *http://www.incentives-asia.com/travel-asia/12_11_98/stories/green.htm.* Travel Asia Web Site, Dec. 11, 1998 (December 7, 1999)

[83] *ISO 14001 Environmental management systems – Specification with guidance for use.* International Organization for Standardization, Switzerland, 1996, Page 1-2.)

Appendix A:

Master Operational Checklist from Manual 1:
An Operating Manual for Owners and Managers.

CMHC, 1997.

APPENDIX 3
OPERATIONS CHECKLIST

HEATING AND VENTILATION

1. Maintain space temperatures as low as possible, consistent with tenant comfort. Lower temperatures when spaces are unoccupied. See Table 1, Chapter 1, for suggested minimums.
2. Provide ventilation at the minimums suggested in Table 3, Chapter 1.
3. Improve insulation standards of structure if possible.
4. Convert single-glazed windows to double wherever feasible, particularly those windows facing within 80° of North.
5. Ensure that seals on windows are in a good state of repair.
6. Install vestibules in entrances.
7. Seal, at intervals, all vertical shafts passing up the building.
8. Wherever possible, install well-sealed dampers to prevent excessive leakage of outside air into the ventilation system.
9. Shut off extract systems at night, when use of cooking and bathroom facilities is light.
10. Shut off corridor-supply units at night.
11. Shut off ventilation in laundry rooms and exercise rooms when these spaces are not occupied.
12. Control swimming-pool systems with a humidistat.
13. Time-schedule garage exhaust, wherever possible. Alternatively, install carbon-monoxide monitoring equipment.
14. Insulate hot-water pipework, boilers, and heat exchangers.
15. Insulate ductwork and seal any leaks.
16. Reduce air flow and system resistance in warm-air heating systems.
17. Reduce water-flow rate and system resistance in pipework systems.
18. Whenever possible, replace filters with others offering less resistance.
19. Discontinue use of preheat coils if they are not essential to operation of the system and if there is no danger of freeze-up.
20. Remove unnecessary dampers.
21. On heating systems, consider increasing the temperature of supply air to allow a reduction in air volume.
22. Ensure that steam traps are not passing steam.
23. Upgrade space temperature control for hydronic heating systems to provide individual control if possible.
24. In electrically heated buildings, change metering system to individual metering, if the budget will cover the cost of the change.
25. Isolate off-line boilers with valves. If shut-down is temporary, reduce but do not cut off the water flow.
26. At part load, operate multiple-boiler installations sequentially as needed.
27. Install stack dampers on boilers.
28. Bleed steam boilers only as often as required.
29. If domestic water is heated by the boiler, install a second small boiler sized to handle the load during summer.
30. When boilers and burners require replacement, acquire equipment that is more energy efficient.
31. Install heat-recovery devices wherever possible.

COOLING

32. Reduce solar gain through windows.
33. Seal wall and window-mounted air conditioning units.
34. Use an economizer cycle if outside air is used during cooling.
35. Increase chilled-water temperature.
36. For multiple-chiller installations, operate chillers sequentially as needed.
37. Isolate off-line chillers.
38. Replace air-cooled condensers by cooling towers.
39. Avoid simultaneous heating and cooling.
40. Operate cooling equipment only when necessary.
41. Install automatic tube cleaners in condensers.
42. Lower condenser-supply water temperature.

DOMESTIC HOT WATER

43. Turn off dhw circulating pumps at night.
44. Increase efficiency of water heater.
45. Insulate dhw supply pipes and storage tanks.
46. Use heat-recovery techniques.
47. Install solar-heating equipment, if the budget permits.
48. Reduce water-flow rates and temperature.

LIGHTING

49. Maintain illumination at levels suggested in Table 2, Chapter 1.
50. Install efficient light sources and fixtures.
51. Locate fixtures where they will be most effective.
52. Adapt design and decoration of space for maximum lighting effect.
53. Replace yellowed and inefficient lens covers.
54. In fluorescent two-lamp fixtures, wherever possible wire two fixtures from a single ballast or install a shorting or phantom tube.
55. Remove unnecessary fixtures.
56. Replace existing ballast with high-efficiency types.
57. Reduce wattage for tungsten fixtures.

58. Replace existing fluorescent fixtures with low-wattage lamps.
59. Replace standard incandescent and reflector bulbs in "pot-light" fixtures with ER bulbs, or use incandescent bulbs with reflectors.
60. Install time clocks to reduce lighting in public spaces during unoccupied periods.
61. Install photo-electric cells to control outside lighting.
62. Install photo-electric cells to switch off lights in public areas illuminated by daylight.
63. Install timer switches on local circuits in intermittently occupied areas.
64. Install movement-sensitive switches to turn out lights in intermittently occupied areas.

OTHER ELECTRICAL SERVICES

65. Replace oversized motors with equipment closely matched to the load.
66. Choose high-efficiency motors.
67. To correct for poor power factor install capacitors across individual motors or the incoming supply.
68. Cycle use of equipment that does not need to be operated continuously.
69. Temporarily turn off equipment during periods of high demand.
70. If the maximum-demand period is predictable, install time clocks to reschedule loads.
71. Turn off all electrical equipment when not required.
72. Reduce the number of elevators in service during periods of light traffic.
73. Regulate block-heater "plug-ins" in accordance with outdoor air temperature.
74. When equipment and appliances are replaced, choose energy-efficient models.

APPENDIX 4
MAINTENANCE CHECKLIST

GENERAL MAINTENANCE

Leaks

1. Check for leaks in the building fabric: inspect weather stripping, gaskets, caulking, door closers, and roofing, especially "flashings".
2. Check for leaks in hot-water systems: inspect equipment connections, expansion joints, pumps and valves.
3. Regularly inspect plumbing systems in public and service areas, particularly hot-water controls.
4. Check for leaks in chilled-water and condenser-cooling systems, compressed-air systems, ventilation systems (ducts, air-handling equipment and dampers), chemical-feed and oil systems.

Cleaning

5. Check, clean and replace filters to maintain efficiency.
6. Keep all equipment clean, removing dirt, dust, scale, rust, and any contaminants as they accumulate.
7. Schedule a thorough cleaning of all equipment once a year.
8. Have water treated to remove contaminants.

Wear

9. Check for wear in rotating equipment.
10. Inspect all fan belts, electrical contacts, brushes in electrical motors, diaphragms on control valves and damper mechanisms.
11. Check that bolts and electrical connections are tight.
12. Inspect duct and pipework insulation to ensure that it is not damaged or wet.
13. Check for deterioration in electrical insulation.
14. Check gaskets to ensure that they are in good condition.
15. Repaint rusted or damaged equipment.

Heating

16. Check the air-to-fuel ratio to ensure efficient combustion.
17. Check boiler stack temperature.
18. Check flues and chimneys for blockages or improper draft conditions.
19. Annually clean all heat-transfer surfaces.
20. Periodically clean boiler equipment, including gas burners, fuel filters, ignition electrodes, nozzles, burner fan blades, burner-flame stabilizers, and air cone/flame-retention head.
21. Regularly check all gaskets, adjusting screws, locknuts, sheave set screws and valve packings.
22. Check for cracks in the boiler refractory lining and repair as necessary.
23. Inspect the boiler insulation to ensure that it is not damaged.
24. Repair all leaks in water, steam, gas and flue-gas systems.
25. Periodically analyze boiler water.
26. Check burner firing period.
27. Inspect oil-line strainers. Clean or replace if dirty.
28. Make regular operating checks according to manufacturers' recommendations.
29. Open boiler relief valve to ensure that it is functioning.
30. Log boiler temperature.
31. Log boiler pressure.
32. Regularly check all steam traps.

Cooling

33. Each week, check oil level and pressure in compressors.
34. Each week, check the refrigerant moisture — liquid indicator.
35. Look for unusual operating conditions.
36. Regularly check discharge pressure and temperature, condenser and chilled-water temperature and flow rates.
37. Regularly check oil filter and refrigerant dryer and change as required.
38. Periodically test oil in sump for acidity.
39. On evaporative condensers, each month lubricate fan and motor bearings and check gear-box lubricant.
40. Once a year, drain the condensing water circuit on water-cooled condensers and check tubes and waterbox.
41. Annually clean condenser tubes.
42. Annually have all controls recalibrated.
43. Annually test refrigerant for contaminants.
44. Perform vibration test on compressor motor to check for shaft or impeller imbalance or bearing wear.
45. Use megohm tests to check deterioration of compressor-motor winding insulation.
46. Bleed water from cooling towers to remove impurities.
47. Chemically treat water if bleeding cannot control scaling and corrosion.
48. Regularly check water-distribution and reservoir system.

49. Each month, inspect and clean suction screens.
50. Each month, clean, adjust and check operation of float valve.

Fans

51. Every three months, or according to manufacturers' recommendations, check lubrication of fan and motor bearings.
52. Check all belts for alignment, tension and signs of wear.
53. Check fan for signs of vibration.

Pumps

54. Every three months, or as recommended by the manufacturer, lubricate motor and pump bearings.
55. At least every three months, check condition of belts.
56. Check alignment of direct-driven pumps.
57. Inspect wet-packed seals monthly and adjust as required.
58. Every one to three months, inspect mechanical seals for leaks.
59. Check all nuts and bolts for tightness and bearings for wear.
60. For reciprocating pumps, periodically remove all dirt and gummy material from valves and valve seats; every six months, drain and refill the crankcase; and annually inspect pistons and cylinder liners for signs of wear.

Valves

61. Check for leaks and ensure packing is tight.
62. Verify operation of hand valves by opening and closing them periodically.
63. Keep exposed valve stems and threads clean and lubricated.
64. Once a year, visually inspect control valves by opening them up.
65. Verify control sequence of control valves once or twice a year.

Electrical Installations

66. Inspect for damage and overheating of cords, cables and switches.
67. Check contacts in switchgear and motor-control gear for pitting.
68. Check condition of gaskets for equipment installed in damp or dirty environments.
69. Check for water leaks in equipment installed out of doors.
70. Check for oil leaks from oil-filled equipment.
71. Lubricate switch and contact mechanisms according to manufacturers' recommendations.
72. Check operation of switches and interlocks.
73. Check tightness of terminal connections.

Lighting

74. Clean light fixtures at least once a year.

Motors

75. Every one to three months, check lubrication.
76. Inspect brushes and brush gear.
77. Periodically clean inside motor by vacuum or blowing.
78. Check bearings for signs of wear.
79. Check condition of driven equipment and motor-control gear.
80. Check hold-down bolts for tightness.
81. Rotate shafts of motors not in use.

Fire Protection Systems

82. Daily, check control panel.
83. Each month, check standby batteries: terminals, electrolyte level, specific gravity, charging rate, voltage and test battery supervision.
84. Check that fire-hose reel and hand valve can be opened and that hose can be drawn out.
85. Test and if necessary recharge fire extinguisher according to manufacturers' recommendations.
86. Each month, check manual alarm points.
87. Thoroughly check entire system once a year.

Appendix B:

ISO 14001 Environmental Management Systems –
Specification with Guidance for Use

Environmental management systems — Specification with guidance for use

1 Scope

This International Standard specifies requirements for an environmental management system, to enable an organization to formulate a policy and objectives taking into account legislative requirements and information about significant environmental impacts. It applies to those environmental aspects which the organization can control and over which it can be expected to have an influence. It does not itself state specific environmental performance criteria.

This International Standard is applicable to any organization that wishes to

a) implement, maintain and improve an environmental management system;

b) assure itself of its conformance with its stated environmental policy;

c) demonstrate such conformance to others;

d) seek certification/registration of its environmental management system by an external organization;

e) make a self-determination and self-declaration of conformance with this International Standard.

All the requirements in this International Standard are intended to be incorporated into any environmental management system. The extent of the application will depend on such factors as the environmental policy of the organization, the nature of its activities and the conditions in which it operates. This International Standard also provides, in annex A, informative guidance on the use of the specification.

The scope of any application of this International Standard must be clearly identified.

NOTE — For ease of use, the subclause of the specification and annex A have related numbers; thus, for example, 4.3.3. and A.3.3 both deal with environmental objectives and targets, and 4.5.4 and A.5.4 both deal with environmental management system audit.

2 Normative references

There are no normative references at present.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1
continual improvement
process of enhancing the environmental management system to achieve improvements in overall environmental performance in line with the organization's environmental policy

NOTE — The process need not take place in all areas of activity simultaneously.

3.2
environment
surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation

NOTE — Surroundings in this context extend from within an organization to the global system.

3.3
environmental aspect
element of an organization's activities, products or services that can interact with the environment

NOTE — A significant environmental aspect is an environmental aspect that has or can have a significant environmental impact.

3.4
environmental impact
any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services

3.5
environmental management system
the part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy

3.6
environmental management system audit
a systematic and documented verification process of objectively obtaining and evaluating evidence to determine whether an organization's environmental management system conforms to the environmental management system audit criteria set by the organization, and for communication of the results of this process to management

3.7
environmental objective
overall environmental goal, arising from the environmental policy, that an organization sets itself to achieve, and which is quantified where practicable

3.8
environmental performance
measurable results of the environmental management system, related to an organization's control of its environmental aspects, based on its environmental policy, objectives and targets

3.9
environmental policy
statement by the organization of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets

3.10
environmental target
detailed performance requirement, quantified where practicable, applicable to the organization or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives

3.11
interested party
individual or group concerned with or affected by the environmental performance of an organization

3.12
organization
company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration

NOTE — For organizations with more than one operating unit, a single operating unit may be defined as an organization.

3.13
prevention of pollution
use of processes, practices, materials or products that avoid, reduce or control pollution, which may include recycling, treatment, process changes, control mechanisms, efficient use of resources and material substitution

NOTE — The potential benefits of prevention of pollution include the reduction of adverse environmental impacts, improved efficiency and reduced costs.

4 Environmental management system requirements

4.1 General requirements

The organization shall establish and maintain an environmental management system, the requirements of which are described in the whole of clause 4.

4.2 Environmental policy

Top management shall define the organization's environmental policy and ensure that it

a) is appropriate to the nature, scale and environmental impacts of its activities, products or services;

b) includes a commitment to continual improvement and prevention of pollution;

c) includes a commitment to comply with relevant environmental legislation and regulations, and with other requirements to which the organization subscribes;

d) provides the framework for setting and reviewing environmental objectives and targets;

e) is documented, implemented and maintained and communicated to all employees;

f) is available to the public.

4.3 Planning

4.3.1 Environmental aspects

The organization shall establish and maintain (a) procedure(s) to identify the environmental aspects of its activities, products or services that it can control and over which it can be expected to have an influence, in order to determine those which have or can have significant impacts on the environment. The organization shall ensure that the aspects related to these significant impacts are considered in setting its environmental objectives.

The organization shall keep this information up-to-date.

4.3.2 Legal and other requirements

The organization shall establish and maintain a procedure to identify and have access to legal and other requirements to which the organization subscribes, that are applicable to the environmental aspects of its activities, products or services.

4.3.3 Objectives and targets

The organization shall establish and maintain documented environmental objectives and targets, at each relevant function and level within the organization.

When establishing and reviewing its objectives, an organization shall consider the legal and other requirements, its significant environmental aspects, its technological options and its financial, operational and business requirements, and the views of interested parties.

The objectives and targets shall be consistent with the environmental policy, including the commitment to prevention of pollution.

4.3.4 Environmental management programme(s)

The organization shall establish and maintain (a) programme(s) for achieving its objectives and targets. It shall include

a) designation of responsibility for achieving objectives and targets at each relevant function and level of the organization;

b) the means and time-frame by which they are to be achieved.

If a project relates to new developments and new or modified activities, products or services, programme(s) shall be amended where relevant to ensure that environmental management applies to such projects.

4.4 Implementation and operation

4.4.1 Structure and responsibility

Roles, responsibility and authorities shall be defined, documented and communicated in order to facilitate effective environmental management.

Management shall provide resources essential to the implementation and control of the environmental management system. Resources include human resources and specialized skills, technology and financial resources.

The organization's top management shall appoint (a) specific management representative(s) who, irrespective of other responsibilities, shall have defined roles, responsibilities and authority for

a) ensuring that environmental management system requirements are established, implemented and maintained in accordance with this International Standard;

b) reporting on the performance of the environmental management system to top management for review and as a basis for improvement of the environmental management system.

4.4.2 Training, awareness and competence

The organization shall identify training needs. It shall require that all personnel whose work may create a significant impact upon the environment, have received appropriate training.

It shall establish and maintain procedures to make its employees or members at each relevant function and level aware of

a) the importance of conformance with the environmental policy and procedures and with the requirements of the environmental management system;

b) the significant environmental impacts, actual or potential, of their work activities and the environmental benefits of improved personal performance;

c) their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the environmental management system, including emergency preparedness and response requirements;

d) the potential consequences of departure from specified operating procedures.

Personnel performing the tasks which can cause significant environmental impacts shall be competent on

the basis of appropriate education, training and/or experience.

4.4.3 Communication

With regard to its environmental aspects and environmental management system, the organization shall establish and maintain procedures for

a) internal communication between the various levels and functions of the organization;

b) receiving, documenting and responding to relevant communication from external interested parties.

The organization shall consider processes for external communication on its significant environmental aspects and record its decision.

4.4.4 Environmental management system documentation

The organization shall establish and maintain information, in paper or electronic form, to

a) describe the core elements of the management system and their interaction;

b) provide direction to related documentation.

4.4.5 Document control

The organization shall establish and maintain procedures for controlling all documents required by this International Standard to ensure that

a) they can be located;

b) they are periodically reviewed, revised as necessary and approved for adequacy by authorized personnel;

c) the current versions of relevant documents are available at all locations where operations essential to the effective functioning of the environmental management system are performed;

d) obsolete documents are promptly removed from all points of issue and points of use, or otherwise assured against unintended use;

e) any obsolete documents retained for legal and/or knowledge preservation purposes are suitably identified.

Documentation shall be legible, dated (with dates of revision) and readily identifiable, maintained in an orderly manner and retained for a specified period. Procedures and responsibilities shall be established and maintained concerning the creation and modification of the various types of document.

4.4.6 Operational control

The organization shall identify those operations and activities that are associated with the identified significant environmental aspects in line with its policy, objectives and targets. The organization shall plan these activities, including maintenance, in order to ensure that they are carried out under specified conditions by

a) establishing and maintaining documented procedures to cover situations where their absence could lead to deviations from the environmental policy and the objectives and targets;

b) stipulating operating criteria in the procedures;

c) establishing and maintaining procedures related to the identifiable significant environmental aspects of goods and services used by the organization and communicating relevant procedures and requirements to suppliers and contractors.

4.4.7 Emergency preparedness and response

The organization shall establish and maintain procedures to identify potential for and respond to accidents and emergency situations, and for preventing and mitigating the environmental impacts that may be associated with them.

The organization shall review and revise, where necessary, its emergency preparedness and response procedures, in particular, after the occurrence of accidents or emergency situations.

The organization shall also periodically test such procedures where practicable.

4.5 Checking and corrective action

4.5.1 Monitoring and measurement

The organization shall establish and maintain documented procedures to monitor and measure, on a regular basis, the key characteristics of its operations and activities that can have a significant impact on the environment. This shall include the recording of information to track performance, relevant operational controls and conformance with the organization's environmental objectives and targets.

Monitoring equipment shall be calibrated and maintained and records of this process shall be retained according to the organization's procedures.

The organization shall establish and maintain a documented procedure for periodically evaluating compliance with relevant environmental legislation and regulations.

4.5.2 Nonconformance and corrective and preventive action

The organization shall establish and maintain procedures for defining responsibility and authority for handling and investigating nonconformance, taking action to mitigate any impacts caused and for initiating and completing corrective and preventive action.

Any corrective or preventive action taken to eliminate the causes of actual and potential nonconformances shall be appropriate to the magnitude of problems and commensurate with the environmental impact encountered.

The organization shall implement and record any changes in the documented procedures resulting from corrective and preventive action.

4.5.3 Records

The organization shall establish and maintain procedures for the identification, maintenance and disposition of environmental records. These records shall include training records and the results of audits and reviews.

Environmental records shall be legible, identifiable and traceable to the activity, product or service involved. Environmental records shall be stored and maintained in such a way that they are readily retrievable and protected against damage, deterioration or loss. Their retention times shall be established and recorded.

Records shall be maintained, as appropriate to the system and to the organization, to demonstrate conformance to the requirements of this International Standard.

4.5.4 Environmental management system audit

The organization shall establish and maintain (a) programme(s) and procedures for periodic environmental management system audits to be carried out, in order to

a) determine whether or not the environmental management system
   1) conforms to planned arrangements for environmental management including the requirements of this International Standard; and
   2) has been properly implemented and maintained; and
b) provide information on the results of audits to management.

The organization's audit programme, including any schedule, shall be based on the environmental importance of the activity concerned and the results of previous audits. In order to be comprehensive, the audit procedures shall cover the audit scope, frequency and methodologies, as well as the responsibilities and requirements for conducting audits and reporting results.

4.6 Management review

The organization's top management shall, at intervals that it determines, review the environmental management system, to ensure its continuing suitability, adequacy and effectiveness. The management review process shall ensure that the necessary information is collected to allow management to carry out this evaluation. This review shall be documented.

The management review shall address the possible need for changes to policy, objectives and other elements of the environmental management system, in the light of environmental management system audit results, changing circumstances and the commitment to continual improvement.

Appendix C:

Telephone Survey Questions

EXPLORING THE ROLE OF ISO 14001 IN RESIDENTIAL BUILDING MANAGEMENT

Name:	
Organization:	
Position:	
Date:	
Time Started:	
Time Finished:	
Phone:	
Fax:	
Email:	
Address:	

General:

1. How long have you been working at (***Organization name***)? [ ] years

2. How long have you been working in the (***industry name***) industry? [ ] years

"A building management system is a systematic approach to dealing with all the maintenance/operations requirements of a building/property. Requirements can range from janitorial and maintenance services, to hiring of personnel/contractors to financial accounting and tenant retention".

Building Management: (*for building managers only*)...

3. Is there a building management system or manual that you follow in the operation of your facility? ○Yes ○ No

4. Are you aware of any other residential building management practices/systems currently in use ? ○Yes ○ No

If yes which (describe)?: _____

5. Are environmental issues, such as recycling, and water and energy conservation programs, integrated into the overall building management system? ○Yes ○ No
   If yes, which ones? _____

"An environmental management system (EMS) is a systematic approach to dealing with the environmental aspects of an organization. It is a 'tool' that enables an organization of any size or type to control the impact of its activities, products or services on the natural environment."

Environmental Management Questions

6. Do you currently have an EMS in place? ○ Yes ○ No

7. On a scale of 1 to 5, 5 being very important, how important is having environmental issues integrated into a building management system? [1 2 3 4 5]

Acceptance

8. Are you familiar with ISO 14001 – Environmental Management System – Specification with guidance for use? ○Yes ○ No If no...

" ISO 14001 is an international standard intended to provide organizations with the elements of an effective EMS which can be integrated with other management requirements, to assist organizations in achieving environmental and economic goals. Compliance with the standard is voluntary and no absolute requirements for environmental performance are established beyond :

- **commitment to compliance with applicable legislation and regulations,**
- **the prevention of pollution, and**
- **commitment to continual improvement."**

9. On a scale of 1 to 5, 5 being very important, how important a role do you feel the ISO 14001, Environmental Management Systems (EMS) would play in multi-unit residential building management? [1 2 3 4 5]

10. On a scale of 1 to 5, 5 indicating high support, how willing would building managers be to adopt ISO 14001 into their management system? [1 2 3 4 5]

11. On a scale of 1 to 5, 5 being very important, which of the following market forces do you think would be required to bring ISO 14001 into practice with residential/commercial building management?

1. Tax Incentives	**1 2 3 4 5**
2. Regulations/legislation	**1 2 3 4 5**
3. Cost Savings	**1 2 3 4 5**
4. Insurance Savings	**1 2 3 4 5**
5. Better Financing Rates	**1 2 3 4 5**
6. Market Demand	**1 2 3 4 5**
7. Desire to Export Services	**1 2 3 4 5**
8. Competition	**1 2 3 4 5**
Any Others Suggested?	

12. On a scale of 1 to 5, 5 being high, please rate the following benefits that could be realized from the use and implementation of this system?

1. Improved Building Performance	**1 2 3 4 5**
2. Liability Limitation	**1 2 3 4 5**
3. Ability to Demonstrate due Diligence	**1 2 3 4 5**
4. Good Public and Community Relations	**1 2 3 4 5**
5. Reduced Costs	**1 2 3 4 5**
6. National and International Recognition	**1 2 3 4 5**

13. On a scale of 1 to 5, 5 indicating very high impact, which of the following do you feel would be barriers to implementing and using the ISO 14000 system?

1. Maintaining the Documents	**1 2 3 4 5**
2. Costs of Establishing Certification	**1 2 3 4 5**
3. No Market Demand	**1 2 3 4 5**
4. Tenant Issues	**1 2 3 4 5**
Any Others?	

ISO 9000

14. Are you ISO 14000 certified? ❍Yes ❍ No If yes, Why? _____

15. Have you ever considered becoming ISO 9000 certified? ❍Yes ❍ No
Why or why not? _____

Tenant Issues

16. On a scale of 1 to 5, 5 being very important, how important a role would tenants play in a building's environmental management system? [1 2 3 4 5]

17. On a scale of 1 to 5, 5 being very effective, how effective would the following incentives be in influencing tenants to conform to an environmental management system if the system required tenants to recycle and compost their garbage and minimize water and energy consumption?

1. Rent reduction/cash incentives	**1 2 3 4 5**
2. Regulations/legislation	**1 2 3 4 5**
3. Improved community atmosphere	**1 2 3 4 5**
4. Environmental protection issues	**1 2 3 4 5**
5. Regular Communication	**1 2 3 4 5**
Any Others Suggested?	

Building Products, Services & Utilities

18. On a scale of 1 to 5, 5 being very useful, how useful would an environmental management system be in helping managers with building product and utility procurement and assessment?
[1 2 3 4 5]

19. Do you know of building managers who currently use this or a related system to make these types of decisions? ❍Yes ❍ No
If yes, who? _____

20. Do you feel an environmental management system would affect the way organizations manufacture, market and supply their product, service or utility? ❍Yes ❍ No

Building Environmental Performance Assessment

21a. Do you currently use any environmental performance assessment tools for your buildings? ❍Yes ❍ No

If yes, which?_____(If yes GOTO 21b, else 24)

21b. How have you gone about incorporating the requirements into the broader building management system?

_____

22. On a scale of 1 to 5, 5 being very useful, how useful are building environmental performance assessment tools to multi-unit residential building management? [1 2 3 4 5]

23. Do you see any relationship between currently used environmental performance assessment tools and ISO 14001? ❍Yes ❍ No Explain: _____

24. Are you familiar with such building environmental performance assessment tools as LEED, BREEAM, BEPAC, R-2000 etc? ❍Yes ❍ No
If yes, which?_____

Following the Structure of ISO 14001

4.2 Environmental Policy

The standard requires that an environmental policy is established and becomes the framework for the EMS.

25a. Does your organization set any policies for your operations? ❍Yes ❍ No (If No goto 25e)

25b. How are policies communicated to employees? _____

25c. How are policies communicated to those outside of the organization? (ie. Contractors/tenants)? _____

25d. How are policies documented in your organization? _____

25e. Who is considered top management in multi-unit residential building management?

_____

4.3 Planning

4.3.1 Environmental Aspects

The standard requires that the environmental aspects of the activities (facility) must initially be determined and, then, considered when setting the objectives.

26. On a scale of 1 to 5, 5 being very large, what impact do you consider multi-unit residential buildings have on the environment? [1 2 3 4 5]

What do you consider to be some of the major impacts? _____

4.3.2 Legal and Other Requirements

The standard requires that a procedure to identify and have access to legal and other requirements to which the building subscribes is established and maintained

27. Do you have a procedure in place to identify and access legal and other requirements ?
❍Yes ❍ No

4.3.3 Objectives and Targets

The standard requires that environmental objectives and targets are established and documented through the consideration of legal and other requirements, significant environmental aspects, and financial, operational and business requirements.

28. Does your organization set objectives and targets? ❍ Yes ❍ No
If Yes, what types? _____
AND How are objectives and targets monitored? _____

4.4 Implementation and Operation

29. Who in building management is best suited to establish, implement and maintain ISO 14000?
_____
Who would they report to at the top management level? _____

4.4.2 Training and Awareness

The standard requires that all personnel, whose work may create a significant impact, receive training and be made aware of environmental issues.

30a. Does your organization use Training? ❍ Yes ❍ No
Does your organization undertake programs to raise awareness? ❍ Yes ❍ No

30b. How do you identify your training needs? _____

31. Do you plan for training needs? ❍ Yes ❍ No

32. Which of the following are ways in which employees currently receive training?

❍ Conference ❍ On job site training ❍ Workshops/Seminars ❍ Reference manuals
❍ Newspapers/magazines ❍ Other: _____

33. Do your contractors get training/awareness? ❍ Yes ❍ No

34. Do your tenants get training/awareness? ❍ Yes ❍ No

4.4.3 Communication

The standard requires that procedures for internal and external communication are established and documented.

35. Which of the following does your organization use to facilitate internal and external communication?

Media	Internal Communications	External Communications
Memos		
Minutes		
Fax		
Bulletins		
Reports		
Staff Meetings		
Email		
Phone		
Internet		
Any Others?		

36. Do you communicate with tenants? ❍ Yes ❍ No
If Yes, how (and frequency?) _____

4.4.4 Environmental Management System Documentation

The standard requires that the core elements of the EMS and their interaction are clearly documented, organized, and maintained.

37a. Do you have any documented systems? ❍ Yes ❍ No

37b. On a scale of 1 to 5, 5 being very difficult, how difficult would the task of integrating an Environmental Management System into existing building management procedures/manuals be?
[1 2 3 4 5]

38. What are the forms of documentation currently used?
Informal methods: _____
Formal methods: _____

4.4.6 Operational Control

The standard requires that operations and activities associated with the significant aspects, policy and objectives and targets are identified. Operational procedures and *situational procedures* are to be established and documented. Procedures related to significant aspects of goods and services used and communicating requirements to suppliers and subcontractors are to be established and maintained.

39. Which of the following forms of communication are currently used to stipulate requirements to suppliers and subcontractors?

❍ Work order ❍ Specifications ❍ Other: _____

Do you think these could also be used to stipulate procedural requirements pertaining to environmental aspects? ❍Yes ❍ No

40. Who are typical suppliers and subcontractors? _____

4.4.7 Emergency Preparedness and Response

The standard requires that procedures to identify the potential for and the response to accidents and emergency situations are established and maintained.

(for building managers)...

41. Which of the following emergency procedures or systems should be/are currently in place in your management system?

❍ Fire ❍ Earthquake ❍ Flood ❍ Electrical failure ❍ Water system failure
(❍ None) ❍ Others: _____

4.5 Checking and Corrective Action

4.5.1 Monitoring and Measurement

The standard requires that procedures to monitor and measure the key characteristics of its operations and activities are established and maintained. This information is a performance record and is to be compared with the objectives and targets.

(for building managers)...

42. Which of the following are currently used methods for monitoring and measuring the condition of a building or property?

❍ Preventive maintenance ❍ Routine checks (frequency?) ❍ Waste Disposal tracking
❍ Tracking of utility consumption ❍ Tenant complaints/Problems ❍ Others: _____

43. What are some of the pieces of equipment that require regular calibration/maintenance in a residential building? (i.e HVAC system, elevator, fire suppression etc):

_____

4.5.3 Records

The standard requires that the Environmental Management System is clearly documented and meticulously maintained.

44. What types of environmental records are kept for an MURB? _____

4.6 Management Review

The standard requires that top management shall review the EMS and address the possible need for changes to the policy, objectives or other EMS elements in light of audit results, changing circumstances and continual improvement.

45. Do you have a review process in place? ❍ Yes ❍ No
If yes, what is the frequency of the process? _____

General Questions/Comments:

46. (Other than the MOEE sector-specific guides) Are you aware of any work currently underway with ISO 14001 regarding building management? ❍Yes ❍ No
If yes, particulars _____

47. What suggestions do you have for us to study the role that ISO 14001 may have in the residential building management? _____

48. At what scale of operations (number of units or tenants) do you feel implementing and EMS would be beneficial to your organization?

49. What is the management organizational structure within your company?

Appendix D:

List of Advisory Board Members

APPENDIX D:

ADVISORY BOARD INTERVIEW PARTICIPANTS

1. Ray Dumochel: Manager of Building Management, Algonquin College
2. Rahumathulla Marikkar: Environmental Management Representative, Interface Flooring Systems
3. Ted Aldcroft: Director Property Operations, O&Y Enterprises
4. Marie Claude Fontaine: Environment, Health and Safety, Soprema
5. Philip Jackson: Operations Manager, Del Property Management
6. Ahmed Husseini and Darryl Nate: Environmental Manager and Project Manager, Canadian Standards Association
7. Glen Allen: Maintenance Coordinator, Centretown Citizens Ottawa Corp.
8. George Kinnear: Director of Technical Services, Ottawa-Carleton Housing
9. John Reimer: Environmental Protection, Winnepeg Health Services
10. Rudy Gervais: Vice President, Canadian Hospital Engineering Society
11. Jane Maslowski: Environmental Protection, Winnepeg Health Services
12. Neil Lathangue: Division Manager, S&R Asset Management
13. Ken Owens: Director of Administrative Services, SRC
14. Alex Zimmerman: Technical Value Manager, BC Buildings Corp.
15. Edie Lipson: Head of Property Management, Akman Management Ltd., Canadian Condominium Institute
16. Bob Bach, Tescor Energy Services
17. Roland Krueger: Environmental Auditor, SGS International Certification Systems.
18. Michael Gibson: Technical Service (Elect, Mech.) Supplier, the State Group.
19. Valerie O'Grady: Environmental Affairs Manager, The Hospital for Sick Children
20. Douglas Domino: Property and Facilities Manager, Public Works Canada
21. Nils Larsson, Green Building Program, Natural Resources Canada C-2000 Program

ADVISORY BOARD INTERVIEW NON-PARTICIPANTS

1. Joe Cascious, IRG Limited
2. Joe Romm, Global Environment and Technology
3. Marion Fraser, Director of Marketing, Enbridge Consumers Gas
4. Nikolaj Tolstoy AB Jacobson & Widmark
5. Paul Morrison, Senior Project Manager, Nortel Networks

Appendix E:

Results of the Telephone Survey:
All Participants

Summary of CMHC INDUSTRY SURVEY RESULTS:
(All Values in Percentages except average rating values.)
TOTAL NUMBER OF INTERVIEW PARTICIPANTS : 21

QUESTION 1: HOW LONG HAVE YOU BEEN WORKING AT (INSERT ORGANIZATION NAME)?
RANGE OF ANSWERS, FOR INTERNAL INFORMATION PURPOSES ONLY.

QUESTION 2: HOW LONG HAVE YOU BEEN WORKING IN THE (INSERT INDUSTRY NAME) INDUSTRY?
RANGE OF ANSWERS, FOR INTERNAL INFORMATION PURPOSES ONLY.

QUESTION 3: IS THERE A BUILDING MANAGEMENT SYSTEM OR MANUAL THAT YOU FOLLOW IN THE OPERATION OF YOUR FACILITY?

YES: 81.25 NO: 18.75 # responding = 16

QUESTION 4: ARE YOU AWARE OF ANY OTHER RESIDENTIAL BUILDING MANAGEMENT PRACTICES/SYSTEMS CURRENTLY IN USE?

YES: 46.67 NO: 53.33 # responding = 15

IF YES, WHICH? ***" Ontario Non-Profit Housing Association has a system, OHC Manual and Standards, Fair Rental Policy Organization, Condominium Management Association of Ontario, Modifications to the Ottawa-Carleton Housing Management System, R2000, Ontario MOE Initiatives"***

QUESTION 5: ARE ENVIRONMENTAL ISSUES, SUCH AS RECYCLING, WATER AND ENERGY CONSERVATION PROGRAMS INTEGRATED INTO THE OVERALL BUILDING MANAGEMENT SYSTEM?

YES: 93.33 NO: 6.67 # responding =15

IF YES, WHICH ONES? ***" Recycling, Water Conservation, Energy Conservation, Solid Waste, Composting Programs, Office Paper Recycling, Yearly Waste Audits, Waste Reduction Programs, Product Specification, Biomedical Waste Management, Asbestos Management, Hazardous Materials"***

QUESTION 6: DO YOU CURRENTLY HAVE AN EMS IN PLACE?

YES: 33.33 NO: 57.14 # responding = 21

QUESTION 7: ON A SCALE OF 1 TO 5, 5 BEING VERY IMPORTANT, HOW IMPORTANT IS HAVING ENVIRONMENTAL ISSUES INTEGRATED INTO A BUILDING MANAGEMENT SYSTEM?

1	2	3	4	5	# responding = 21
			61.90	38.10	

AVERAGE VALUE = 4.38

QUESTION 8: ARE YOU FAMILIAR WITH ISO 14001?

YES: 80.95 NO: 19.05 # responding = 21

QUESTION 9: ON A SCALE OF 1 TO 5, 5 BEING VERY IMPORTANT, HOW IMPORTANT A ROLE DO YOU FEEL THE ISO 14001 EMS WOULD PLAY IN MULTI-UNIT RESIDENTIAL BUILDING MANAGEMENT?

1	2	3	4	5	# responding = 21
	9.52	9.52	71.43	9.52	

AVERAGE VALUE = 3.81

QUESTION 10: ON A SCALE OF 1 TO 5, 5 INDICATING HIGH SUPPORT, HOW WILLING WOULD BUILDING MANAGERS BE TO ADOPT ISO 14001 INTO THEIR MANAGEMENT SYSTEM?

1	2	3	4	5	# responding = 21
	42.86	38.10	14.29	4.76	

AVERAGE VALUE = 2.81

QUESTION 11: ON A SCALE OF 1 TO 5, 5 BEING VERY IMPORTANT, WHICH OF THE FOLLOWING MARKET FORCES DO YOU THINK WOULD BE REQUIRED TO BRING ISO 14001 INTO PRACTICE WITH RESIDENTIAL/COMMERCIAL BUILDING MANAGEMENT?

TAX INCENTIVES # responding = 20

1	2	3	4	5
	5	10	55	30

AVERAGE VALUE = 4.1

REGULATION/LEGISLATION # responding = 20

1	2	3	4	5
	15	15	30	40

AVERAGE VALUE = 3.95

COST SAVINGS: # responding = 20

1	2	3	4	5
5		20	20	55

AVERAGE VALUE = 4.15

INSURANCE SAVINGS # responding = 20

1	2	3	4	5
	5	20	40	35

AVERAGE VALUE = 4.05

BETTER FINANCING RATES: # responding = 20

1	2	3	4	5
	5	35	35	25

AVERAGE VALUE = 3.8

MARKET DEMAND: # responding = 21

1	2	3	4	5
4.76	19.05	14.29	23.81	38.10

AVERAGE VALUE = 3.71

DESIRE TO EXPORT SERVICES: # responding = 20

1	2	3	4	5
30	20	30	20	

AVERAGE VALUE = 2.4

COMPETITION: # responding = 20

1	2	3	4	5
5	10	40	30	15

AVERAGE VALUE = 3.4

OTHER: # responding = 0 **N/A**

1	2	3	4	5

QUESTION 12: ON A SCALE OF 1 TO 5, 5 BEING HIGH, PLEASE RATE THE FOLLOWING BENEFITS THAT COULD BE REALIZED FROM THE USE AND IMPLEMENTATION OF THIS SYSTEM?

IMPROVED BUILDING PERFORMANCE: # responding =21

1	2	3	4	5
	9.52	33.33	33.33	23.81

AVERAGE VALUE = 3.71

LIABILITY LIMITATION: # responding = 21

1	2	3	4	5
	4.76	23.81	33.33	38.10

AVERAGE VALUE = 4.05

ABILITY TO DEMONSTRATE DUE DILIGENCE # responding = 21

1	2	3	4	5
		23.81	42.86	33.33

AVERAGE VALUE = 4.10

GOOD PUBLIC AND COMMUNITY RELATIONS: # responding = 21

1	2	3	4	5
	4.76	38.10	28.57	28.57

AVERAGE VALUE = 3.81

REDUCED COSTS: # responding = 21

1	2	3	4	5
4.76	14.29	19.05	23.81	38.10

AVERAGE VALUE = 3.76

NATIONAL AND INTERNATIONAL RECOGNITION: # responding = 21

1	2	3	4	5
9.52	28.57	42.86	9.52	9.52

AVERAGE VALUE = 2.81

QUESTION 13: ON A SCALE OF 1 TO 5, 5 INDICATING VERY HIGH IMPACT, WHICH OF THE FOLLOWING DO YOU FEEL WOULD BE BARRIERS TO IMPLEMENTING AND USING THE ISO 14000 SYSTEM?

MAINTAINING THE DOCUMENTS: # responding = 21

1	2	3	4	5
		23.81	47.62	28.57

AVERAGE VALUE = 4.05

COSTS OF ESTABLISHING CERTIFICATION: # responding = 21

1	2	3	4	5
		19.05	42.86	38.10

AVERAGE VALUE = 4.19

NO MARKET DEMAND: # responding = 21

1	2	3	4	5
	4.76	33.33	19.05	42.86

AVERAGE VALUE = 4.00

TENANT ISSUES: # responding = 21

1	2	3	4	5
	19.05	23.81	47.62	12.50

AVERAGE VALUE = 3.63

QUESTION 14: ARE YOU ISO 9000 CERTIFIED?

YES: 25.00 NO: 75.00 # responding = 20

QUESTION 15: HAVE YOU EVER CONSIDERED BECOMING ISO 9000 CERTIFIED?

YES: 52.94 NO: 47.06 # responding = 17

IF YES, WHY? *"Seems to be of value in industry, Would like to see Guidelines published to ease implementation, Might be a good idea in general but no market demand, Good idea but seems to apply more to product development operations, Want to be leading edge, Want international recognition,*

IF NO, WHY NOT? *"Don't have resources in terms of time, Never heard of it, More important for international companies, Dealing with new Legislation perceived to be overwhelming, Not considered a high priority for company, Has never been discussed in organization, Already follow other Guidelines don't see need for it, Seems to concentrate more on consistancy rather than improvement, Already have a quality control system in place, Accreditation Process, Lack of Information."*

QUESTION 16: ON A SCALE OF 1 TO 5, 5 BEING VERY LARGE, HOW IMPORTANT A ROLE WOULD TENANTS PLAY IN A BUILDING'S ENVIRONMENTAL MANAGEMENT SYSTEM?

1	2	3	4	5	# responding = 20
	10	10	35	45	

AVERAGE VALUE = 4.15

QUESTION 17: ON A SCALE OF 1 TO 5, 5 BEING VERY EFFECTIVE, HOW EFFECTIVE WOULD THE FOLLOWING INCENTIVES BE IN INFLUENCING TENANTS TO CONFORM TO AN ENVIRONMENTAL MANAGEMENT SYSTEM?

RENT REDUCTION/CASH INCENTIVE: # responding = 21

1	2	3	4	5
	4.76	4.76	47.62	42.86

AVERAGE VALUE = 4.29

REGULATION/LEGISLATION: # responding = 21

1	2	3	4	5
9.52	19.05	38.10	23.81	9.52

AVERAGE VALUE = 3.05

IMPROVED COMMUNITY ATMOSPHERE: # responding = 21

1	2	3	4	5
	14.29	52.38	23.81	9.52

AVERAGE VALUE = 3.29

ENVIRONMENTAL PROTECTION ISSUES: # responding = 21

1	2	3	4	5
	23.81	57.14	14.29	4.76

AVERAGE VALUE = 3.00

REGULAR COMMUNICATION: # responding = 21

1	2	3	4	5
4.76	14.29	19.05	52.38	9.52

AVERAGE VALUE = 3.48

QUESTION 18: ON A SCALE OF 1 TO 5, 5 BEING VERY USEFUL, HOW USEFUL WOULD AN ENVIRONMENTAL MANAGEMENT SYSTEM BE IN HELPING BUILDING MANAGERS WITH BUILDING PRODUCT AND UTILITY PROCUREMENT AND ASSESSMENT?

1	2	3	4	5	# responding = 21
		38.10	57.14	4.76	

AVERAGE VALUE = 3.67

QUESTION 19: DO YOU KNOW OF ANY BUILDING MANAGERS WHO CURRENTLY USE THIS OR A RELATED SYSTEM TO MAKE THESE TYPES OF DECISIONS?

YES: 38.10 NO: 61.90 # responding = 21

IF YES, WHO? *" Public Works and Government Services Canada In House Group, Algonquin uses an EMS for Energy Tracking, B.C. Building Corp. uses an energy accounting Lucliff Property Management"*

QUESTION 20: DO YOU FEEL AN ENVIRONMENTAL MANAGEMENT SYSTEM WOULD AFFECT THE WAY ORGANIZATIONS MANUFACTURE, MARKET, AND SUPPLY THEIR PRODUCT, SERVICE OR UTILITY?

YES: 95.24 NO: 4.76 # responding = 21

QUESTION 21a: DO YOU CURRENTLY USE ANY ENVIRONMENTAL PERFORMANCE ASSESSMENT TOOLS FOR YOUR BUILDINGS?

YES: 31.58 NO: 68.42 # responding = 19

IF YES, WHICH? *"BEPAC, Utility Tracking Programs, Environmental Baseline Checklists, Waste Disposal and Energy and Water Conservation Programs, Recycling Monitoring, In house 'ecometrics'."*

QUESTION 21b: HOW HAVE YOU GONE ABOUT INCORPORATING THE REQUIREMENTS INTO THE BROADER BUILDING MANAGEMENT?

"P.M. Program, Workplans, Communicate all Costs to Clients, Haven't Really, Waste Audits, Have ISO 14001 Certification, Use in house ecometrics program"

QUESTION 22: ON A SCALE OF 1 TO 5, 5 BEING VERY USEFUL, HOW USEFUL ARE BUILDING ENVIRONMENTAL PERFORMANCE ASSESSMENT TOOLS TO MULTI-UNIT RESIDENTIAL BUILDING MANAGEMENT?

1	2	3	4	5	# responding = 10
	10	40	20	30	

AVERAGE VALUE = 3.7

QUESTION 23: DO YOU SEE ANY RELATIONSHIP BETWEEN CURRENTLY USED BEPAs AND ISO 14000?

YES: 87.50 NO: 12.50 # responding = 8

IF NO, EXPLAIN: *" Struture is radically different between tools and ISO 14000"*

IF YES, EXPLAIN: *" Use of tools could be incorporated into ISO Framework, Checklists in tools could help set goals and targets, Tools could be integrated into and EMS under ISO, Could help to identify performance measures and environmental aspects, Could be integrated with P.M. programs, Reference ISO 14031"*

QUESTION 24: ARE YOU FAMILIAR WITH SUCH BEPAs AS LEED, BREEAM, BEPAC, R-2000, ETC?

YES: 85 NO: 20 # responding = 20

IF YES, WHICH? *" R-2000, BREEAM, BEPAC, LEED, C-2000"*

QUESTION 25a: DOES YOUR ORGANIZATION SET ANY POLICIES FOR YOUR OPERATIONS?

YES: 95 NO: 5 # responding = 20

QUESTION 25b: HOW ARE POLICIES COMMUNICATED TO EMPLOYEES?

" Verbally, Email, Manuals, Letters, Memos, Bulletins, Instruction Manuals, Policy Manuals,

Workshops, Communiques, Deputy Minister Directives, Company Newspapers, intranet Policy Manual, Website , Meetings, Information Updates, Postings, Training, ISO Procedure Book."

QUESTION 25c: HOW ARE POLICIES COMMUNICATED TO THOSE OUTSIDE OF THE ORGANIZATION?

" Specifications, Meetings, Flyers, Newsletters, Reports, Newsletters, Directives, Regulations, Operating Manuals, Public Postings, Dedicated Personnel, Website, In Contract Parcels, Training Programs."

QUESTION 25d: HOW ARE POLICIES DOCUMENTED IN YOUR ORGANIZATION?

" Manuals, Minutes, Individual Building Files, Deputy Minister Directives, Operating Manuals, Company Library, Spelled out in business plan, Electronic Data base."

QUESTION 25e: WHO IS CONSIDERED TOP MANAGEMENT IN MULTI-UNIT RESIDENTIAL BUILDING MANAGEMENT?

" Head of Property Management Division, General Manager of Housing, Property Manager, Departmental Coordinator, Operations Manager, Regional and National Offices, Building Managers, Company President, Corporate Leaders Committee, Senior V,P. of Quality, Director of Building Services, Director of Property Management, CEO, Regional Director."

QUESTION 26: ON A SCALE OF 1 TO 5, 5 BEING VERY LARGE, WHAT IMPACT DO YOU CONSIDER MULTI-UNIT RESIDENTIAL BUILDINGS TO HAVE ON THE ENVIRONMENT?

1	**2**	**3**	**4**	**5**	# responding = 20
	5	35	45	15	
AVERAGE VALUE =		**3.7**			

WHAT DO YOU CONSIDER TO BE SOME OF THE MAJOR IMPACTS?

" Cleaning Chemicals, Water Consumption, Waste Generation, Energy Consumption, Storm Sewar Contamination, Hazardous Materials, Land Use, Green House Gas Generation, CRD waste, Waste Water Generation, Air Pollution, Lack of Recyclables Diversion, Resource Consumption, Ozone Depleting Substances, Fugitive Emissions, Bio Medical Waste, Indoor Air Pollution"

QUESTION 27: DO YOU HAVE A PROCEDURE IN PLACE TO IDENTIFY AND ACCESS LEGAL AND OTHER REQUIREMENTS?

YES: 89.47 NO: 10.53 # responding = 19

QUESTION 28: DOES YOUR ORGANIZATION SET OBJECTIVES AND TARGETS?

YES: 89.47 NO: 10.53 # responding = 19

IF YES, WHAT TYPES? *"Environmental, Energy, Management, Financial, Energy, Waste, Water, Recycling, Business Goals, Occupancy Targets, Physical Asset Performance, Operations, Material Selection, Quality, Behavioral Change, Baseline Targets"*

AND HOW ARE OBJECTIVES AND TARGETS MONITORED?

"Annual Inspections, ISO 14000 Reports on all Facilities, Montly Invoices, Annual Comparisons, Audits, Energy Counting System, Quarterly Reviews, Semi Annual Reviews, Apprasils, Annual Review, Invoice Comparisons, Performance Reports, Quizes, Utility Tracking."

QUESTION 29: WHO IN BUILDING MANAGEMENT IS BEST SUITED TO ESTABLISH, IMPLEMENT AND

MAINTAIN ISO 14000?

"Property Managers, Manager Level, Need combination of Front Lines and Core Management, Director of Administrative Services, Operations Manager, Property Management Committee, Divisional Manager, Director of Technical Services, Manager of Building Services Director of Property Services."

WHO WOULD THEY REPORT TO AT THE TOP MANAGEMENT LEVEL?

"Regional and National Offices, Senior Management, President, Vice President, Property Manager, Owners, Board of Directors, CEO, General Manager, Director of Building Management."

QUESTION 30a: DOES YOUR ORGANIZATION USE TRAINING? # responding = 19

YES: 100 NO: 0

DOES YOUR ORGANIZATION UNDERTAKE PROGRAMS TO RAISE AWARENESS?

YES: 100 NO: 0

QUESTION 30b: HOW DO YOU IDENTIFY YOUR TRAINING NEEDS?

"MOE Information, Informal Personnel Reviews, Legislation, by Need, by Experience, Personnel Devel. Plans, Training Plans, Dictated by Department Upper Management, Annual Assessment, Performance Evaluations, Dedicated Training Department Personnel, Non-Conformance Problems, Periodic Analysis, Walk Around Observation, Employee Feedback, Mini Waste Audits"

QUESTION 31: DO YOU PLAN FOR YOUR TRAINING NEEDS?

YES: 84.21 NO: 15.79 # responding = 19

QUESTION 32: WHICH OF THE FOLLOWING ARE WAYS IN WHICH EMPLOYEES CURRENTLY RECEIVE TRAINING?

responding = 19

Conference:	84.21
On job site training:	100
Workshops/Seminars:	100
Reference Manuals:	78.95
Newspapers/Magazines:	63.16
Other:	68.42

QUESTION 33: DO YOUR CONTRACTORS GET TRAINING AND AWARENESS?

YES: 63.16 NO: 36.84 # responding =19

QUESTION 34: DO YOUR TENANTS GET TRAINING AND AWARENESS?

YES: 80.00 NO: 20.00 # responding = 15

QUESTION 35: WHICH OF THE FOLLOWING DOES YOUR ORGANIZATION USE TO FACILITATE INTERNAL AND EXTERNAL COMMUNICATION?

responding = 19

	Internal	**External**
Memos:	94.74	57.89
Minutes:	89.47	52.63
Fax:	63.16	94.74
Bulletins:	89.47	57.89
Reports:	100	84.21

Staff Meetings:	100	10.53
Email:	94.74	84.21
Phone:	94.74	94.74
Internet:	68.42	89.47
Other:	63.16	52.63

QUESTION 36: DO YOU COMMUNICATE WITH TENANTS?

YES: 100 NO: 0 # responding = 16

IF YES, HOW AND HOW FREQUENTLY?

"Based on Need, Daily, Weekly, Monthly"

QUESTION 37a: DO YOU HAVE ANY DOCUMENTED SYSTEMS?

YES: 83.33 NO: 16.67 # responding = 18

QUESTION 37b: ON A SCALE OF 1 TO 5, 5 BEING VERY DIFFICULT, HOW DIFFICULT WOULD THE TASK OF INTEGRATING AN EMS INTO EXISTING BUILDING MANAGEMENT PROCEDURES/MANUALS BE?

1	**2**	**3**	**4**	**5**	# responding = 18
	22.22	38.89	33.33	5.56	

AVERAGE VALUE = 3.22

QUESTION 38: WHAT ARE THE FORMS OF DOCUMENTATION CURRENTLY USED?

"Memos, Policies and Procedures, Manuals, Minutes, E Files, Inspection Reports, Purchase Orders, Tenant Complaint Forms, Utility Records and Receipts, Financial Reports, Correspondence, File Server, P.M. Records, Safety Inspection Records, Email Files, Audit Reports, Way Bills, Work Orders, Guideline, Assessment Forms, ISO 14000 Binder/Manual, Waste Tracking, Operating Policies, Codes of Practice, Informal Meetings/Verbal, Providence Software, Forms, Checklists, Gap Analysis Documents."

QUESTION 39: WHICH OF THE FOLLOWING FORMS OF COMMUNICATION ARE CURRENTLY USED TO STIPULATE REQUIREMENTS TO SUPPLIERS AND SUBCONTRACTORS?

responding = 18

Work Order:	88.89
Specifications:	100
Other:	61.11

DO YOU THINK THESE COULD ALSO BE USED TO STIPULATE PROCEDURAL REQUIREMENTS PERTAINING TO ENVIRONMENTAL ASPECTS?

YES: 94.44 NO: 5.56 # responding = 18

QUESTION 40: WHO ARE SOME TYPICAL SUPPLIERS AND SUBCONTRACTORS IN THE INDUSTRY?

" Utilities, Plumbing, Mechanical, Janitorial, Elevator Maintenance, Roof Repair, Painters, Landscapers, Carpenters, Masons, Waste Removal, Snow Removal, Chemical Vendors, HVAC Maintenance, Construction Contractors, Office Suppliers, Building Services, Installers, Hazardous Waste Management Companies, Medical Product Suppliers, Recycling Companies, Auditors, Internet Providers, Textile Distributors, Engineering Companies, Fire Protection Experts."

QUESTION 41: WHICH OF THE FOLLOWING EMERGENCY PROCEDURES OR SYSTEMS SHOULD BE/ ARE CURRENTLY IN PLACE IN YOUR MANAGEMENT SYSTEM?

responding = 19

Fire:	100

Earthquake:	36.84
Flood:	63.16
Electrical Failure:	78.95
Water System Failure:	73.68
None:	0.00
Others:	73.68

QUESTION 42: WHICH OF THE FOLLOWING ARE CURRENTLY USED METHODS FOR MONITORING AND MEASURING THE CONDITION OF A BUILDING OR PROPERTY?

responding = 18

Preventative Maintenance:	100
Routine Checks:	94.44
Waste Disposal Tracking:	66.67
Tracking of Utility Consumption:	94.44
Tenant Complaints/Problems:	100
Other:	50.00

QUESTION 43: WHAT ARE SOME OF THE PIECES OF EQUIPMENT THAT REQUIRE REGULAR CALIBRATION/MAINTENANCE IN A RESIDENTIAL BUILDING?

"HVAC, Elevators, Fire Protection and Suppression Devices, Emergency Generators, CO Monitors, Parking Garage, Hot Water Boilers, Lighting System, Alarm Systems, Building Structure, Water Meters, Electrical, Indoor Environment Controls, Landscape First Aid Equipment"

QUESTION 44: WHAT TYPES OF ENVIRONMENTAL RECORDS ARE KEPT FOR A MURB?

" Waste Tracking, Water Consumption, Energy Consumption, Training of Personnel, Hazardous Waste (asbestos), Building Inspections, PCBs (older buildings), Ozone Depleting Substances, Spill Records, Building Repair Invoices, Non Conformance Reports, Complaints, Material Purchasing, Transportation Monitoring, Audit Reports, Management Reviews"

QUESTION 45: DO YOU HAVE A MANAGEMENT REVIEW PROCESS IN PLACE?

YES: 84.21 NO: 15.79 # responding = 19

IF YES, WHAT IS THE FREQUENCY OF THE PROCESS?

" Monthly, Annually, As Required, Quarterly, Semi Annually"

QUESTION 46: OTHER THAN PROVINCIAL SECTOR SPECIFIC GUIDES, ARE YOU AWARE OF ANY WORK CURRENTLY UNDERWAY WITH ISO 14001 REGARDING BUILDING MANAGEMENT?

YES: 27.78 NO: 72.22 # responding = 18

IF YES, PARTICULARS: ***"Public Works and Government Services Canada, B.C. Buildings Corp., BOMA, O&Y Enterprises, Toronto Hospital, Revised BREEAM Document, Sustainable Building Design"***

QUESTION 47: WHAT SUGGESTIONS DO YOU HAVE FOR US IN OUR STUDY OF THE ROLE THAT ISO 14001 MAY HAVE IN RESIDENTIAL BUILDING MANAGEMENT?

"Cost Benefits Must be Emphasized to Sell it, Stress Benefits to Owners, Balance between Voluntary and Regulated Requirements, Need Direct Interaction with Owners and Feedback, Needs a Catalyst/Market Demand to get it going, Need pilot projects, Keep Paperwork as low as possible, Need to have some sort of Government assistance, Stress abilities to solve day to day problems, Develop Sector Specific Guides, ISO Documents need to be streamlined and presented in clear language, Continue to build awareness,

Needs to be simplified especially for smaller organizations, Needs some sort of Government incentive to happen, Need to consider practicality for residential buildings."

QUESTION 48: AT WHAT SCALE OF OPERATIONS (NUMBER OF UNITS OR TENANTS) DO YOU FEEL IMPLEMENTING AN EMS WOULD BE BENEFICIAL?

" Any Scale of Operations, Minimal, 1500 Units, Building by Building Basis, Over 100 Units, 50 or more units, Larger Scale, at Least 500 units, Larger Organizations, Over 24 Units."

QUESTION 49: WHAT IS THE MANAGEMENT ORGANIZATIONAL STRUCTURE WITHIN YOUR COMPANY?

RANGE OF ANSWERS, FOR INTERNAL INFORMATION PURPOSES ONLY.

Appendix F:

Results of the Telephone Survey:
Participants from Residential Sector

Summary of CMHC INDUSTRY SUBSET SURVEY RESULTS:
(All Values in Percentages except average rating values.)
NUMBER OF RESIDENTIAL BUILDING MANAGEMENT INTERVIEW PARTICIPANTS : 5

QUESTION 1: HOW LONG HAVE YOU BEEN WORKING AT (INSERT ORGANIZATION NAME)?
RANGE OF ANSWERS, FOR INTERNAL INFORMATION PURPOSES ONLY.

QUESTION 2: HOW LONG HAVE YOU BEEN WORKING IN THE (INSERT INDUSTRY NAME) INDUSTRY?
RANGE OF ANSWERS, FOR INTERNAL INFORMATION PURPOSES ONLY.

QUESTION 3: IS THERE A BUILDING MANAGEMENT SYSTEM OR MANUAL THAT YOU FOLLOW IN THE OPERATION OF YOUR FACILITY?

YES: 60.00 NO: 40.00 # responding = 5

QUESTION 4: ARE YOU AWARE OF ANY OTHER RESIDENTIAL BUILDING MANAGEMENT PRACTICES/SYSTEMS CURRENTLY IN USE?

YES: 100.00 NO: 0.00 # responding = 5

IF YES, WHICH? ***" Ontario Non-Profit Housing Association has a system, OHC Manual and Standards, Fair Rental Policy Organization, Condominium Management Association of Ontario, Modifications to the Ottawa-Carleton Housing Management System."***

QUESTION 5: ARE ENVIRONMENTAL ISSUES, SUCH AS RECYCLING, WATER AND ENERGY CONSERVATION PROGRAMS INTEGRATED INTO THE OVERALL BUILDING MANAGEMENT SYSTEM?

YES: 100.00 NO: 0.00 # responding =5

IF YES, WHICH ONES? ***" Recycling, Water Conservation, Energy Conservation, Solid Waste."***

QUESTION 6: DO YOU CURRENTLY HAVE AN EMS IN PLACE?

YES: 0.00 NO: 100.00 # responding = 5

QUESTION 7: ON A SCALE OF 1 TO 5, 5 BEING VERY IMPORTANT, HOW IMPORTANT IS HAVING ENVIRONMENTAL ISSUES INTEGRATED INTO A BUILDING MANAGEMENT SYSTEM?

1	**2**	**3**	**4**	**5**	# responding = 5
			60.00	40.00	

AVERAGE VALUE = 4.40

QUESTION 8: ARE YOU FAMILIAR WITH ISO 14001?

YES: 40.00 NO: 60.00 # responding = 5

QUESTION 9: ON A SCALE OF 1 TO 5, 5 BEING VERY IMPORTANT, HOW IMPORTANT A ROLE DO YOU FEEL THE ISO 14001 EMS WOULD PLAY IN MULTI-UNIT RESIDENTIAL BUILDING MANAGEMENT?

1	**2**	**3**	**4**	**5**	# responding = 5
	20.00	20.00	40.00	20.00	

AVERAGE VALUE = 3.60

QUESTION 10: ON A SCALE OF 1 TO 5, 5 INDICATING HIGH SUPPORT, HOW WILLING WOULD BUILDING MANAGERS BE TO ADOPT ISO 14001 INTO THEIR MANAGEMENT SYSTEM?

1	**2**	**3**	**4**	**5**	# responding = 5
	60.00	20.00	20.00		

AVERAGE VALUE = 2.08

QUESTION 11: ON A SCALE OF 1 TO 5, 5 BEING VERY IMPORTANT, WHICH OF THE FOLLOWING MARKET FORCES DO YOU THINK WOULD BE REQUIRED TO BRING ISO 14001 INTO PRACTICE WITH RESIDENTIAL/COMMERCIAL BUILDING MANAGEMENT?

TAX INCENTIVES # responding = 5

1	2	3	4	5
	20	20	20	40

AVERAGE VALUE = 3.8

REGULATION/LEGISLATION # responding = 5

1	2	3	4	5
		40	20	40

AVERAGE VALUE = 4

COST SAVINGS: # responding = 5

1	2	3	4	5
		20	20	60

AVERAGE VALUE = 4.4

INSURANCE SAVINGS # responding = 5

1	2	3	4	5
	20	20		60

AVERAGE VALUE = 4

BETTER FINANCING RATES: # responding = 5

1	2	3	4	5
		80		20

AVERAGE VALUE = 3.4

MARKET DEMAND: # responding = 5

1	2	3	4	5
	20.00	20.00		60.00

AVERAGE VALUE = 4.00

DESIRE TO EXPORT SERVICES: # responding = 5

1	2	3	4	5
40	40	20		

AVERAGE VALUE = 1.8

COMPETITION: # responding = 5

1	2	3	4	5
	40	20		40

AVERAGE VALUE = 3.4

OTHER: # responding = 0 **N/A**

1	2	3	4	5

QUESTION 12: ON A SCALE OF 1 TO 5, 5 BEING HIGH, PLEASE RATE THE FOLLOWING BENEFITS THAT COULD BE REALIZED FROM THE USE AND IMPLEMENTATION OF THIS SYSTEM?

IMPROVED BUILDING PERFORMANCE: # responding =5

1	2	3	4	5
		40.00		60.00

AVERAGE VALUE = 4.20

LIABILITY LIMITATION: # responding = 5

1	2	3	4	5

		60.00		40.00

AVERAGE VALUE = 3.80

ABILITY TO DEMONSTRATE DUE DILIGENCE # responding = 5

1	2	3	4	5
		60.00	40.00	

AVERAGE VALUE = 3.00

GOOD PUBLIC AND COMMUNITY RELATIONS: # responding = 5

1	2	3	4	5
		60.00	20.00	20.00

AVERAGE VALUE = 2.89

REDUCED COSTS: # responding = 5

1	2	3	4	5
		20.00	20.00	60.00

AVERAGE VALUE = 4.40

NATIONAL AND INTERNATIONAL RECOGNITION: # responding = 5

1	2	3	4	5
	60.00	40.00		

AVERAGE VALUE = 2.40

QUESTION 13: ON A SCALE OF 1 TO 5, 5 INDICATING VERY HIGH IMPACT, WHICH OF THE FOLLOWING DO YOU FEEL WOULD BE BARRIERS TO IMPLEMENTING AND USING THE ISO 14000 SYSTEM?

MAINTAINING THE DOCUMENTS: # responding = 5

1	2	3	4	5
		40.00	20.00	40.00

AVERAGE VALUE = 4.00

COSTS OF ESTABLISHING CERTIFICATION: # responding = 5

1	2	3	4	5
		40.00	40.00	20.00

AVERAGE VALUE = 3.80

NO MARKET DEMAND: # responding = 5

1	2	3	4	5
		20.00		80.00

AVERAGE VALUE = 4.60

TENANT ISSUES: # responding = 5

1	2	3	4	5
	40.00		40.00	20.00

AVERAGE VALUE = 3.40

QUESTION 14: ARE YOU ISO 9000 CERTIFIED?

YES: 0.00 NO: 100.00 # responding = 5

QUESTION 15: HAVE YOU EVER CONSIDERED BECOMING ISO 9000 CERTIFIED?

YES: 40.00 NO: 60.00 # responding = 5

IF YES, WHY? ***"Seems to be of value in industry."***

IF NO, WHY NOT? ***"Don't have resources in terms of time, Never heard of it, More important***

for international companies, Dealing with new Legislation perceived to be overwhelming."

QUESTION 16: ON A SCALE OF 1 TO 5, 5 BEING VERY LARGE, HOW IMPORTANT A ROLE WOULD TENANTS PLAY IN A BUILDING'S ENVIRONMENTAL MANAGEMENT SYSTEM?

1	2	3	4	5	# responding = 5
	20		20	60	

AVERAGE VALUE = 4.2

QUESTION 17: ON A SCALE OF 1 TO 5, 5 BEING VERY EFFECTIVE, HOW EFFECTIVE WOULD THE FOLLOWING INCENTIVES BE IN INFLUENCING TENANTS TO CONFORM TO AN ENVIRONMENTAL MANAGEMENT SYSTEM?

RENT REDUCTION/CASH INCENTIVE: # responding = 5

1	2	3	4	5
			60.00	40.00

AVERAGE VALUE = 4.40

REGULATION/LEGISLATION: # responding = 5

1	2	3	4	5
	20.00	60.00		20.00

AVERAGE VALUE = 3.20

IMPROVED COMMUNITY ATMOSPHERE: # responding = 5

1	2	3	4	5
	20.00	40.00		40.00

AVERAGE VALUE = 3.60

ENVIRONMENTAL PROTECTION ISSUES: # responding = 5

1	2	3	4	5
	40.00	40.00		20.00

AVERAGE VALUE = 3.00

REGULAR COMMUNICATION: # responding = 5

1	2	3	4	5
	20.00	20.00	60.00	

AVERAGE VALUE = 3.40

QUESTION 18: ON A SCALE OF 1 TO 5, 5 BEING VERY USEFUL, HOW USEFUL WOULD AN ENVIRONMENTAL MANAGEMENT SYSTEM BE IN HELPING BUILDING MANAGERS WITH BUILDING PRODUCT AND UTILITY PROCUREMENT AND ASSESSMENT?

1	2	3	4	5	# responding = 5
		60.00	20.00	20.00	

AVERAGE VALUE = 3.60

QUESTION 19: DO YOU KNOW OF ANY BUILDING MANAGERS WHO CURRENTLY USE THIS OR A RELATED SYSTEM TO MAKE THESE TYPES OF DECISIONS?

YES: 40.00 NO: 60.00 # responding = 5

IF YES, WHO? *" Public Works and Government Services Canada In House Group, Ontario Realy Corporation, Conservation Co-op, Mountain Equipmet Co-op"*

QUESTION 20: DO YOU FEEL AN ENVIRONMENTAL MANAGEMENT SYSTEM WOULD AFFECT THE WAY ORGANIZATIONS MANUFACTURE, MARKET, AND SUPPLY THEIR PRODUCT, SERVICE OR UTILITY?

YES: 100.00 NO: 0.00 # responding = 5

QUESTION 21a: DO YOU CURRENTLY USE ANY ENVIRONMENTAL PERFORMANCE ASSESSMENT TOOLS FOR YOUR BUILDINGS?

YES: 0.00 NO: 100.00 # responding = 5

IF YES, WHICH? ***N/A***

QUESTION 21b: HOW HAVE YOU GONE ABOUT INCORPORATING THE REQUIREMENTS INTO THE BROADER BUILDING MANAGEMENT?

N/A

QUESTION 22: ON A SCALE OF 1 TO 5, 5 BEING VERY USEFUL, HOW USEFUL ARE BUILDING ENVIRONMENTAL PERFORMANCE ASSESSMENT TOOLS TO MULTI-UNIT RESIDENTIAL BUILDING MANAGEMENT?

1	2	3	4	5	# responding = 1
		100			

AVERAGE VALUE = **3**

QUESTION 23: DO YOU SEE ANY RELATIONSHIP BETWEEN CURRENTLY USED BEPAs AND ISO 14000?

N/A # responding = 0

QUESTION 24: ARE YOU FAMILIAR WITH SUCH BEPAs AS LEED, BREEAM, BEPAC, R-2000, ETC?

YES: 100 NO: 0 # responding = 5

IF YES, WHICH? ***" R-2000, BREEAM, BEPAC"***

QUESTION 25a: DOES YOUR ORGANIZATION SET ANY POLICIES FOR YOUR OPERATIONS?

YES: 80 NO: 20 # responding = 5

QUESTION 25b: HOW ARE POLICIES COMMUNICATED TO EMPLOYEES?

"Workshops, Communiques, Verbally, Email, Manuals, Letters, Memos, Bulletins, Instruction Manuals, Policy Manual."

QUESTION 25c: HOW ARE POLICIES COMMUNICATED TO THOSE OUTSIDE OF THE ORGANIZATION?

" Specifications, Verbally, Letters, Meetings, Flyers, Newsletters, Directives."

QUESTION 25d: HOW ARE POLICIES DOCUMENTED IN YOUR ORGANIZATION?

"Minutes, Manuals, Individual Building Files."

QUESTION 25e: WHO IS CONSIDERED TOP MANAGEMENT IN MULTI-UNIT RESIDENTIAL BUILDING MANAGEMENT?

" General Manager, Departmental Coordinator, Property Manager, Head of Property Management, Operations Managers."

QUESTION 26: ON A SCALE OF 1 TO 5, 5 BEING VERY LARGE, WHAT IMPACT DO YOU CONSIDER MULTI-UNIT RESIDENTIAL BUILDINGS TO HAVE ON THE ENVIRONMENT?

1	2	3	4	5	# responding = 5
		80		20	

AVERAGE VALUE = 3.4

WHAT DO YOU CONSIDER TO BE SOME OF THE MAJOR IMPACTS?

"Waste generation, Lack of Recyclables Diversion, Water consumption, Energy consumption, Cleaning Chemicals, Land Use, Storm Sewar Contamination, Hazardous material use."

QUESTION 27: DO YOU HAVE A PROCEDURE IN PLACE TO IDENTIFY AND ACCESS LEGAL AND OTHER REQUIREMENTS?

YES: 80.00 NO: 20.00 # responding = 5

QUESTION 28: DOES YOUR ORGANIZATION SET OBJECTIVES AND TARGETS?

YES: 100.00 NO: 0.00 # responding = 5

IF YES, WHAT TYPES? ***" Financial, Asset Protection, Utility Consumption, Corporate Goals, Operations, Policy, Tenent Satisfaction, Business Goals, Physical Asset Performance, Occupancy Targets."***

AND HOW ARE OBJECTIVES AND TARGETS MONITORED?

" Semi Annual Review, Annual Review, Apprasils, Evaluations."

QUESTION 29: WHO IN BUILDING MANAGEMENT IS BEST SUITED TO ESTABLISH, IMPLEMENT AND MAINTAIN ISO 14000?

" Director of Technical Services, Property Management Committee, Divisional Manager, Property Manager, Operations Manager."

WHO WOULD THEY REPORT TO AT THE TOP MANAGEMENT LEVEL?

" General Manager, Board of Directors, CEO, Owners, Vice President."

QUESTION 30a: DOES YOUR ORGANIZATION USE TRAINING? # responding = 5

YES: 100 NO: 0

DOES YOUR ORGANIZATION UNDERTAKE PROGRAMS TO RAISE AWARENESS?

YES: 100 NO: 0

QUESTION 30b: HOW DO YOU IDENTIFY YOUR TRAINING NEEDS?

" Assessment, Performance Evaluations, By Need, Determined by Departmental Upper Management."

QUESTION 31: DO YOU PLAN FOR YOUR TRAINING NEEDS?

YES: 80.00 NO: 20.00 # responding = 5

QUESTION 32: WHICH OF THE FOLLOWING ARE WAYS IN WHICH EMPLOYEES CURRENTLY RECEIVE TRAINING?

	# responding = 5
Conference:	100
On job site training:	100
Workshops/Seminars:	100
Reference Manuals:	80.00
Newspapers/Magazines:	80.00

Other: 60.00

QUESTION 33: DO YOUR CONTRACTORS GET TRAINING AND AWARENESS?

YES: 40.00 NO: 60.00 # responding =5

QUESTION 34: DO YOUR TENANTS GET TRAINING AND AWARENESS?

YES: 60.00 NO: 40.00 # responding = 5

QUESTION 35: WHICH OF THE FOLLOWING DOES YOUR ORGANIZATION USE TO FACILITATE INTERNAL AND EXTERNAL COMMUNICATION?

responding = 5

	Internal	External
Memos:	100	80
Minutes:	100	60
Fax:	40	100
Bulletins:	100	80
Reports:	100	100
Staff Meetings:	100	0
Email:	80	100
Phone:	100	100
Internet:	20	60
Other:	80	60

QUESTION 36: DO YOU COMMUNICATE WITH TENANTS?

YES: 100 NO: 0 # responding = 5

IF YES, HOW AND HOW FREQUENTLY?

"Based on Need, Daily, Weekly, Monthly"

QUESTION 37a: DO YOU HAVE ANY DOCUMENTED SYSTEMS?

YES: 40.00 NO: 60.00 # responding = 5

QUESTION 37b: ON A SCALE OF 1 TO 5, 5 BEING VERY DIFFICULT, HOW DIFFICULT WOULD THE TASK OF INTEGRATING AN EMS INTO EXISTING BUILDING MANAGEMENT PROCEDURES/MANUALS BE?

1	2	3	4	5	# responding = 4
		50.00	50.00		

AVERAGE VALUE = 3.50

QUESTION 38: WHAT ARE THE FORMS OF DOCUMENTATION CURRENTLY USED?

" Memos, Policies and Procedures, Notifications, Invoices of Utility use, Manuals, Minutes, Email Files, E Files, Inspection Records, Purchase Orders, Financial Reports, Receipts."

QUESTION 39: WHICH OF THE FOLLOWING FORMS OF COMMUNICATION ARE CURRENTLY USED TO STIPULATE REQUIREMENTS TO SUPPLIERS AND SUBCONTRACTORS?

responding = 5

Work Order:	100.00
Specifications:	100
Other:	60.00

DO YOU THINK THESE COULD ALSO BE USED TO STIPULATE PROCEDURAL REQUIREMENTS PERTAINING TO ENVIRONMENTAL ASPECTS?

YES: 100.00 NO: 0.00 # responding = 5

QUESTION 40: WHO ARE SOME TYPICAL SUPPLIERS AND SUBCONTRACTORS IN THE INDUSTRY?

" Mechanical, Electrical, Painters, Building Structure, Landscaping, Utilities, Plumbing, Janitorial, Elevator Maintenance, Roofing Companies, Construction Contractors, Masons, Waste Removal, Chemical Vendors, HVAC Maintenance."

QUESTION 41: WHICH OF THE FOLLOWING EMERGENCY PROCEDURES OR SYSTEMS SHOULD BE/ ARE CURRENTLY IN PLACE IN YOUR MANAGEMENT SYSTEM?

responding = 5

Fire:	100
Earthquake:	20.00
Flood:	80.00
Electrical Failure:	100.00
Water System Failure:	100.00
None:	0.00
Others:	40.00

QUESTION 42: WHICH OF THE FOLLOWING ARE CURRENTLY USED METHODS FOR MONITORING AND MEASURING THE CONDITION OF A BUILDING OR PROPERTY?

responding = 5

Preventative Maintenance:	100
Routine Checks:	100.00
Waste Disposal Tracking:	40.00
Tracking of Utility Consumption:	80.00
Tenant Complaints/Problems:	100
Other:	40.00

QUESTION 43: WHAT ARE SOME OF THE PIECES OF EQUIPMENT THAT REQUIRE REGULAR CALIBRATION/MAINTENANCE IN A RESIDENTIAL BUILDING?

" HVAC, Elevators, Fire Protection and Suppression Devices, Alarm Systems, CO Monitoring, Emergency Generators, Hot Water Boilers, Lighting."

QUESTION 44: WHAT TYPES OF ENVIRONMENTAL RECORDS ARE KEPT FOR A MURB?

" Utility Consumption Tracking, Maintenance Records, Hazardous Waste (asbestos) Personnel Training."

QUESTION 45: DO YOU HAVE A MANAGEMENT REVIEW PROCESS IN PLACE?

YES: 80.00 NO: 20.00 # responding = 5

IF YES, WHAT IS THE FREQUENCY OF THE PROCESS?

" Monthly, Annually, As Required, Quarterly, Semi Annually"

QUESTION 46: OTHER THAN PROVINCIAL SECTOR SPECIFIC GUIDES, ARE YOU AWARE OF ANY WORK CURRENTLY UNDERWAY WITH ISO 14001 REGARDING BUILDING MANAGEMENT?

YES: 0.00 NO: 100.00 # responding = 5

IF YES, PARTICULARS: ***N/A***

QUESTION 47: WHAT SUGGESTIONS DO YOU HAVE FOR US IN OUR STUDY OF THE ROLE THAT ISO 14001 MAY HAVE IN RESIDENTIAL BUILDING MANAGEMENT?

" Direct interaction with owners needs to occur as well as feedback, Balance requirements between voluntary and regulatory, Cost benefits must be stressed, Stress benefits to owners."

QUESTION 48: AT WHAT SCALE OF OPERATIONS (NUMBER OF UNITS OR TENANTS) DO YOU FEEL IMPLEMENTING AN EMS WOULD BE BENEFICIAL?

" Minimal, Building by building basis, 1500 units."

QUESTION 49: WHAT IS THE MANAGEMENT ORGANIZATIONAL STRUCTURE WITHIN YOUR COMPANY?

RANGE OF ANSWERS, FOR INTERNAL INFORMATION PURPOSES ONLY.