Energy Performance Contracting and the Residential Sector Technical Report

Introduction

Energy Performance Contracting (EPC) is an energy management service that allows private contractors to enter into arrangements with property-owners to reduce energy use by implementing customized energy-efficiency upgrades in their buildings. Services include energy audits, design and specification, project management and commissioning, monitoring, training and financing. EPC is often carried out by Energy Service Companies (ESCOs), which are paid according to the client's achieved energy savings. The advantage of EPC is that operating costs can be reduced and energy efficiency improved with no up-front costs and with limited risk to the facility owner.

To date, ESCOs have focused almost exclusively on commercial and institutional sectors. Implementation in the Canadian housing sector has been minimal, and the residential market has been viewed as high-risk, diffuse and difficult to manage.

Research Program

The aim of this 1996 study was to assess whether EPC could be applied effectively to the residential sector. The study involved four major components: a profile of the Canadian residential sector and opportunities for EPC; a situation assessment of the EPC industry; an industry survey addressing the market potential for EPC in the residential sector; and recommendations for policy and program follow-up.

Results

EPC Opportunities in the Residential Sector

The study showed opportunities for energy management in Canada in terms of the type of housing stock, the vintage of the dwellings and the perceived need for repair work. Feasible efficiency upgrades include replacement of existing apartment boilers with high-efficiency units, retrofit of oil-fired furnaces with high-efficiency units, replacement of domestic hot water systems with high-efficiency units and improvement of thermal performance of dwelling envelopes. The investment potential is in the range of $550 to $650 million.

Cette publication est aussi disponible en français sous le titre : *Les services éconergétiques et le secteur résidentiel*

Market characteristics, such as rent control, the renovation decision-making process and consumer attitudes towards renovation, would influence any residential sector market penetration by EPC.

A Situation Assessment of the EPC Industry

The EPC Industry in Canada

The study found that a mature EPC industry operates in most regions of Canada. EPC services are offered by 40 to 50 registered ESCOs, most of which operate in the commercial/institutional sector in Ontario. Total revenues for these companies (from all services) range from $1 million to $1 billion. Much of the industry's success in non-residential sectors is attributed to two interventions by governments and utilities: the Guaranteed Energy Performance Program launched by Ontario Hydro to stimulate building retrofits through EPC; and the Federal Buildings initiative, launched by Natural Resources Canada to reduce the operating costs of federal buildings by improving energy efficiency.

The industry has improved its success by offering project management and performance guarantees and through effective marketing. It has also initiated innovative risk management arrangements, such as repayment based on monthly energy savings and energy savings insurance packages.

The EPC Industry in the U.S. Residential Sector

Despite relatively few players in the market, the EPC industry has successfully entered the U.S. residential sector. In the U.S., about three million dwellings – mostly low-rise residential buildings – have been retrofitted under EPC contracts. Utility-sponsored programs initially attracted ESCOs to retrofit activities in single detached home segment of the residential market. As the U.S. market shifts away from utility programs, social housing is becoming a very attractive sub-market for EPC: the scale of the projects is large, the housing is in poor condition, and there is a need to cut operating costs.

Potential for EPC in the Residential Sector

The study assessed Canadian ESCOs' interest in entering the residential sector. It identified high-rise apartments and high-rise and medium-rise social housing as the segments with the greatest potential, as these offer better investment returns and greater control of day-to-day energy use in the buildings.

ESCOs also identified barriers to EPC entry into the residential market and possible responses to overcoming these barriers (see table below).

They noted that institutional intervention would be required for ESCOs to enter the residential market. Examples of interventions would include:

- facilitating access of ESCOs to social housing;
- briefing financial and risk assurance industries on EPC and residential market opportunities;
- organizing demonstration projects for the industry and for building owners/managers; and
- endorsing ESCOs to lend credibility.

Table 1:
Barriers and Solutions to EPC Entry into the Residential Market

Barrier	Response/Solution
The inability to control occupant behaviour (e.g., heat levels, window openings) reduces the effectiveness of upgrades, particularly in rental properties where tenants have no financial incentive to conserve energy.	Educate occupants and maintenance personnel to gain their cooperation.
Approval processes are complicated by the range of ownership (e.g., low-rise freehold housing, cooperatives, condominiums) and by complex decision-making processes.	Customize contracts to address specific ownership arrangements.
Rent control limits returns on energy investments.	Lobby for changes in legislation.
ESCOs prefer to deal with contracts over $500,000, a problem for most segments of the residential sector.	Consider smaller projects (as small as $3,000 to $5,000) and "bundle" buildings to achieve economies of scale and an acceptable level of investment.
Payment based on energy savings can be risky, particularly in the residential sector.	Target priority markets, such as high-rise rental apartments and social housing; apply proven energy management measures that offer reasonably fast pay-backs; customize contracts to meet specific needs.

Implication for the Housing Industry

The study showed substantial energy saving potential for EPC in the residential market. Since about 10 to 16 percent of the housing stock is in need of major repair, energy management by EPCs could be effectively combined with renovation work to provide a cost-effective piggyback opportunities.

The ESCO service companies surveyed consider the residential market to be viable and maintain that a cooperative, partnership approach with institutions such as CMHC would assist them to gain entry to the market at a level of risk commensurate with that in other market sectors.

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***Research Report**: Residential Retrofit Potential in Canada, 1997*

A full report on this research project is available from the Canadian Housing Information Centre at the address below.