Research & Development Highlights

92-204 Technical Swies

Barriers to the Use of Energy Efficient Residential Ventilation Devices

Introduction

Changes to the building codes are likely to result in an increase in the number of mechanical ventilation devices and systems in housing and in their frequency of use. Because present equipment is woefully inefficient, much higher operating costs result for electrical input energy that are actually required for ventilation flows. The longevity and other operating characteristics (noise & vibration levels) of most devices are also inappropnate.

Research Program

industry opinion was sampled by means of an open-ended telephone questionnaire, delivered to 31 individuals representing a cross-section of the industry. The responses were summarized and analyzed, to better understand the barriers to change. A number of suggested strategies were developed, based on consideration of those barriers, to increase the energy efficiency of residential ventilation devices in new and existing houses. Strongly held and frequently-voiced opinions were also summarized, even when they are at variance with know science or facts. A separate study investigated the present and likely future efficiencies in much greater detail.

FindIngs

Although all respondents claimed to be aware that most residential ventilation devices are extremely inefficient, only a few displayed a real understanding of the science or the implications of those inefficiencies. Several respondents strongly argued points that are at variance with currently held scientific opinion. Others argued that energy efficiency, per se, as irrelevant, maintaining that concern should rather be directed towards functional design, total energy consumption or heat recovery losses. Those factors are important, of course but not to the exclusion of energy efficiency.

Air-moving efficiency (how much power it takes to move air, compared to how much is used to perform the task) was frequently confused with heat recovery efficiency (how much power it takes heat or cool the air, compared to how much is available in exhaust or intake flows).

Most respondents cited CMHC reports or papers as their source of information on the energy efficiency of fans. The companion research project on that subject (Efficient and Effective Residential Air Handling Devices) should be much more useful as a source of further information than what has been available to date.

Opinions about the potential for technical improvements varied in the extreme. Apparently no common understanding exists in regards to the kinds of technical changes that are possible, desirable or effective. Responses tended to focus on particular types of devices (bathroom fans, range hood fans, heat recovery ventilators, forced-air circulation motor-blowers, or central exhaust fans, and so on), rather than the controller, motor, and fan sets themselves. The most frequently cited improvement was a change to a permanent split capacitor motor from the present shaded pole variety used in bathroom and range hoods, and to higher efficiency motors for forced-air systems.

Industry plans for change are poorly defined, with the notable exception of the work by Ontario Hydro to promote the use of higher efficiency blower motors in furnaces, and the General Electric work on higher-efficiency motors, including the EEPROM ECM motor that has been recently publicized. Few respondent knew the cost of operating ventilation devices, and most did not think it would become a major issue in the near future.

The most common barriers to the supply and use of energy-efficient residential ventilation devices mentioned were the lack of a national standard and thA r~aJrrAflt low AIActric.ltv orites Many other factors

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were mentioned.

Respondents seemed to support almost all suggested strategies, although doubts were frequently expressed about the potential for educating householders or influencing manufacturers without more research and planning.

An examination of the life-cycle costs of typical residential ventilation systems indicated that major improvements in energy efficiency could be cost-effective because existing equipment is so inefficient. Because of the present lack of knowledge about the of operating costs and uncertainties about production costs of more efficient equipment; however, hard projections of optimum efficiencies are not yet possible.

The single largest barrier to achieving higher energy efficiency appears to be consumer emphasis on first cost. The other major barrier is that the decision makers seldom bear the costs of poor efficiency.

Implications for the Housing Industry

With increased use of ventilation systems, the present cost of operating air exchange devices and systems is in the order of a hundred dollars a year. Continuous operation of a forced-air blower, for comfort and continuous filtration, costs many hundreds of dollars per annum. Both are many times higher than they should and could be, but neither the consumer nor industry are aware of the costs or possible savings.

An increased awareness, say through publicity on the findings of several recent projects about the energy-efficiency of many such residential devices, could produce a rapid demand for improvements. Standards for measurement, optimal levels of performance and new sizing and installation protocols all have to be developed, if this change is to be orderly and efficient. Some provincial agencies may opt for unilateral action, if all concerned persons and agencies do not work towards rapid consensus on action and move quickly to make the necessary changes.

Project Manager: Jim White
Research Report: Barriers to the Use of Energy Efficient Residential Ventilation Devices (1992)
Research Consultant: Sheftair Scientific Ltd.
A fuU report on this research project is available from the Canadian Housing Information Centre at the address below.

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The Canadian Housing Information Centre
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7

Telephone: (613) 748-2367
FAX: (613) 748-2098