THE COMPATIBILITY OF ENERGY EFFICIENCY AND INDOOR AIR QUALITY IN RESIDENCES

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SUMMARY

The quality of air within buildings is becoming recognized as an issue of concern to the general public. Articles in the popular press, in trade journals, and in the scientific literature all attest to its importance as an environmental health issue. The case can be made quite simply. Pollutant concentrations within buildings are frequently higher than those outdoors. Since people spend seventy to ninety percent of their time within buildings, exposures to potentially harmful airborne pollutants [where exposure is approximately the product of the concentration and the time] are dominated by exposures within buildings. If one is concerned about health effects due to airborne pollutants, one should concentrate on the exposures that occur within buildings.

Often, a direct coupling is made between energy efficient buildings and indoor air problems. While this position seems to be intuitively obvious, it is difficult to find field measurements that support the idea. There are many reasons for this. The measurements are difficult and expensive. There is not a large data set of field measurements available for examination. However, more important is the observation that indoor pollutant concentrations depend on many factors in addition to ventilation. The assumption implicit in suggesting that the indoor concentrations are likely to be a problem in low-ventilation buildings is that the concentration is dominated by ventilation, i.e., by a removal process. Our experience, from many years of study of these problems, is that concentrations are dominated by *sources* and *source emission rates* rather than by ventilation.

This presentation examines the existing field data from projects and programs in which the ventilation rates were changed. In most cases these occur in weatherization programs in which thermal losses are reduced by adding insulation and reducing air leakage. In some situations we examine projects in which ventilation rates were deliberately increased, e.g., through the addition of an air-to-air heat exchanger to examine its effect on indoor pollutant concentrations.

The changes that have been observed in indoor air quality due to weatherization have been modest. Nonetheless they have been observed in some situations and should occur if sources remain constant. Weatherization can result in an aggregate gain in indoor air quality if simple pollutant measurements occur in the buildings to identify problem structures. If mitigation occurs to correct the problems (a task that does not require herioc efforts), then there is a net benefit to public health.