CLIMATIC SUITABILITY, INDOOR COMFORT AND HOUSEHOLD ENERGY CONSUMPTION : A STUDY OF SUBURBAN HOUSES IN ADELAIDE, SOUTH AUSTRALIA

by

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SUMMARY

This study of suburban houses in Adelaide endeavours to analyse their climatic suitability and provision of indoor comfort, relative to the energy consumption of the household. It was prompted by an apparent neglect of climatic considerations in domestic design, planning and construction and the consequent need to achieve indoor comfort only by considerable use of energy for heating and cooling and/or alterations and modifications to the house. Although Adelaide enjoys a "Mediterranean" type climate, it is subject to greater extremes in some respects, than any other capital city in Australia. While most urban development has taken place during an era of cheap, readily available fuel there was no need for house-designers, builders and occupants to consider or concentrate on "energy efficiency". The onset of the "energy-crisis" of the (late) 1970's, with its rising fuel prices and possible fuel shortages is, however, likely to change attitudes. This study attempts to provide data on which such behavioural and attitudinal changes could be based.

House facade photographs, an interview/questionnaire schedule of 452 houses and a small temperature survey were used to collect data on the nature of the house and its occupants, priorities in its purchase, existing methods of achieving comfort, past and anticipated house modification, the householder's evaluation of its comfort and general attitude to, and knowledge of, climatic design principles. Data on the seasonal and annual consumption of electricity, gas and heating oil for the sampled householders were obtained from the South Australian energy supply authorities.

In addition, interviews and discussions with architects, building-designer and house-construction firms, real estate agents and business firms dealing

in such products as domestic air conditioning and ceiling insulation were completed. Information from such sources was integrated in order to evaluate the relative importance of the "climate factor" in the design, construction, sale, occupation and modification of Adelaide's houses. Other methods of evaluation included the development of an index of climatic suitability (the combined effect of several attributes of design and structure contributing to thermal performance), the analysis of householders' three-fold evaluations of the comfort of their homes, and the use of stepwise regression procedures to develop operational models of household energy consumption.

It was thus shown that, both for houses of the past and in houses being built in the mid 1970's, low priority had been given to climatic suitability and indoor comfort in the processes of design and construction and in house sales or purchases. Consequently there was a relatively high level of weather induced discomfort, householder dissatisfaction and house modification to ameliorate conditions. This was particularly evident in the recently-constructed houses of the sample (in which, for example, 50 per cent of householders were dissatisfied with room temperatures in summer, and, within five years of moving into the house, ceiling insulation, outside awnings and air conditioning had been added to 50, 31 and 28 per cent of houses, respectively) The degree to which annual energy consumption was shown to be related to the size of the house, the number and nature of occupants, the major appliances and amenities of the houses and the household income is also shown. Rather than consider climatic suitability and potential comfort during design, construction and purchase of a house, most householders preferred to rely on relatively costly rectification procedures and/or energy consuming appliances in order to achieve the desired level of indoor comfort. Among builders and salesmen, the importance of such factors as costs, tradition, sales appeal, room layout and appearance were stressed.

Given the desirability of improved thermal comfort and the necessity of conserving finite energy resources, methods of effecting change in Adelaide's housing and some of the practical difficulties and implications are discussed. It is concluded that energy-conservation measures in existing houses may be best achieved by the individual householder, but the acceptability of climatically-suited, comfortable and energy-efficient new dwellings depends on the efforts of the designers, planners and builders on the one hand and the real estate agents, lending authorities and house-buying public on the other.