

2 August 1999

Building Performance Study
Productivity Commission
Locked Bag 2
Collins Street East
MELBOURNE VIC 8003

Dear Sirs,

Following is our submission on the Issue Paper "Improving the Future Performance of Buildings"

Background

ACADS-BSG is a company that develops, distributes and supports computer software for the building services industry including programs for air conditioning load estimation, ductwork and piping systems design, etc., and building energy estimation programs. The two engineers that work for the company have collectively over sixty years of design and construction experience in the industry. Through the supply of programs, their support and the comprehensive training we provide, we come into contact with a large section of the industry and receive continuous feedback on the use of this type of software. In particular we market two building energy estimation programs; BUNYIP a program developed by CSIRO and BEAVER/ESP a program which was originally developed in the USA but now we have the marketing rights for in Australia.

With this extensive experience in the industry and wide range of contacts, I believe we can contribute to this particular research project from a different perspective than that which can be provided by individual design, construction, owner or investor organisations.

1 How often do building designers use computer programs to estimate building energy consumption

Of the 250 organisations that use our programs, only some 20 are current users of BEAVER/ESP and none use the program BUNYIP. This is despite the fact that there have been more than sixty organisations that have licensed these programs over the fifteen years we have been marketing these programs. Of those using BEAVER/ESP there are very few that would use this program more than two or three times per year. In fact usage is so low that users often ask us to do the runs for them because of lack of familiarity with the program due to low usage.

This can be compared with our load estimation program CAMEL which is used to size air conditioning plant in a building. We have close to 200 organisations currently using this program and many use it two and three times a week so that the relative usage of BEAVER/ESP to CAMEL is of the order of 1:5000. Now not all buildings require an energy study to be carried out but it can be deduced from these that there are not many building designers using computer programs to estimate building energy consumption.

2 What are the deterrents to using energy programs?

The possible reasons why designers do not use energy simulation programs extensively (bearing in mind they can be effectively used for new buildings and retrofitting existing buildings) are:-

- (i) the price of the software may be too high
- (ii) the program is too difficult to use. This could be due to technical difficulties in modelling the building and/or the building services or the difficulty in inputting data and interpreting the results.

- (iii) designers are generally not paid any additional fees for undertaking a building energy consumption calculation.
- (iv) owners and investors are generally not interested in doing energy studies. There are numerous reasons for this including:
 - energy costs are only a relatively small part of the overall operating costs
 - energy consumption costs are tax deductible
 - many investors are only interested in the short term and this usually precludes spending extra capital (and fees) to save energy
 - the tenants often pay the energy costs

We can only provide anecdotal evidence on the significance of these factors but in our view, from comments we have received from users (iii) and (iv) are the most significant, ie. There is very little incentive for designers to consider energy consumption (and even less so for green house gas emissions).

The difficulty of use is not an insignificant factor and is worth further comment. There is little that can be done about the difficulty in modelling a building and its services. Buildings and more particularly their services are very complex systems and this is a fact of life. The area where there is scope for improvement is the user friendliness of the programs. We have done a lot of work in this area. WINDOWS has certainly provided the opportunity to improve the user interface and we have been progressively converting all our programs to WINDOWS. However it has been a long haul for various reasons.

- (i) because of the low usage level there is little money available to do the work
- (ii) WINDOWS itself adds an extra overhead to the program in terms of on-going updates and with the new versions that keep arriving on the market. It also adds considerably to the cost because of the peripheral software required.
- (iii) minimal funds also make it difficult to incorporate new features to model different and innovative building constructions and services systems. Most building energy estimation programs have major technical limitations in certain areas and it is a fact of life that the time when designers do want to use an energy estimation program is when something novel is being considered. Many energy estimation programs are getting further and further out of touch with industry developments

3 Are there other Programs available from overseas

Currently in Australia the main building energy estimation programs that are available are:

BUNYIP	developed by CSIRO and distributed and supported by ourselves.
BEAVER/ESP	originally developed in the USA but an Australianised version is distributed and supported in Australia by ourselves.
E-20	A program developed by Carrier Air Conditioning, an equipment supplier in the USA.
TRACE	A program developed by The Trane Air Conditioning Co., an equipment supplier in the USA.
DOE2	A program developed by the US Department of Energy with usage support provided by the University of NSW. This support however is confined to the calculation part of the program which is available separately from the numerous front end data entry programs available in the USA.

There are also other energy estimation programs available mainly from the USA but the most important factor for users to consider in licensing these programs is the amount of local support available both with the use and application of the program and most importantly with the technical aspects of the program, eg. How to use the program to model a system which the program does not cater for as just one example. There have been a number of occasions when

we have had to get into our programs and modify the code to cater for a users particular modelling problem. This is rarely possible with programs available from overseas.

4 Day lighting

Although there are available programs for “designing” lighting and Day lighting systems, there are no programs or even manual methods that can be used in Australia to estimate with any degree of accuracy the energy savings from natural lighting. The main reason for this is that except for Sydney there is no reliable recorded hourly data available on natural lighting.

One possible way around this problem would be to establish a correlation between solar radiation and daylight. A reasonable amount of solar (thermal) radiation data is available (70 locations in Australia) and this is currently used in our energy simulation programs. If this correlation could be established then our existing programs could be adapted to incorporate at least a reasonable estimate of energy savings from Day lighting.

We have considered this for some time now but once again the problem is money and resources. It would be an excellent subject for a PhD project or for CSIRO.

5 Life Cycle Costing

To perform a life cycle cost analysis on a building a reasonable estimate of the energy consumption is required and this comes back to the use of building energy simulation programs.

If building owners and investors don't want an energy study done or aren't prepared to pay for this then a life cycle cost analysis will not be very accurate. Designers, when asked to do a life cycle cost analysis considering alternatives, will often approximate the energy consumption by guesstimating the equivalent full load running hours and arbitrarily apply an efficiency or COP weighted approximately for part load operation.

Another difficulty with life cycle costing is a lack of reliable data on maintenance costs. Designers will usually guesstimate this simply as a percentage of capital cost.

A further problem is the availability of life expectancy data for various items of airconditioning plant. Such data is scarce.

We have been considering the development of a life cycle cost program but the lack of data mentioned above and the fact that there seems to be little demand for such a program has lead to us leaving it on the back burner

I hope these comments are of some value to you and if I can be of further assistance please do not hesitate to contact me.

Yours Faithfully

Murray Mason CPEng
Director