

neca

New South Wales chapter: national electrical and communications association
13 Burwood Road Burwood New South Wales 2134 Australia
P O Box 1106 Burwood North New South Wales 2134
telephone +61 2 9744 1099 facsimile + 61 2 9744 1830
email necansw@neca.asn.au website <http://www.neca.asn.au>

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

Fax. 03 9653 2305

Dear Sir,

Improving the Future Performance of Buildings

Enclosed is our submission. Several publications will follow as soon as they arrive from the USA.

NECA is a national body consisting of over 4500 member organisations, 1300 of which are established in NSW. It is estimated that 90% of all electrical work undertaken in buildings including housing is done by our members. In the major commercial building area it would be reasonable to state that 99% of the work is undertaken by our larger contractor members, some of whom employ several hundred employees, including professional engineers involved in both design and management.

Major construction contractors during the past three decades have slowly usurped the previous traditional roles of architects and their professional teams. Contractors motivated by project cost savings at the expense of subcontractors and not for the benefit of the client, make inroads into design features and this has resulted in a shift of professional involvement. This shift and advancement in building techniques brought about fast track procurement methods and a greater emphasis on the design build concept. The impact of design build is well illustrated in the NECA (USA) publication June 99, which shows a growth of from less than 5% in 1985 to 25% in 1995 and anticipated 35% by 2000.

Major construction contractors pursued the concept of partnering in an attempt to produce better financial and delivery outcomes but in practice this has not worked. The partnering did not start at the design stage but after extensive tendering, retendering, design modifications and price reductions. Only then subcontractors are asked to become part of the partnering system to enable the construction to proceed with minimal additional costs and delays, but for no financial reward. The latest move is to

develop relationship contracting, encouraging innovation in design and construction and this now provides incentives with financial rewards in areas such as energy saving.

At this point in time, consulting engineering still play the major role in designing energy efficient systems in buildings. As relationship contracting develops and further increases occur in the percentage of design and construct projects, electrical contractors will begin to play a greater role in input saving techniques.

We have also included references to publications from our sister organisation NECA in the USA.

It is our opinion that unless legislative requirements are incorporated in the Building Code of Australia the majority of buildings will continue to be constructed regardless of energy efficiency considerations.

Power consumption in the engineering disciplines of electrical and air conditioning are major factors. Until such time as these two disciplines are considered in both the design and construction aspects simultaneously there will not be a major change in what the Productivity Commission is attempting to achieve. They are generally considered in isolation with the resultant conflict in achieving the best end products in terms of initial cost and long term efficiency.

Regrettably time does not permit a wider and in depth consultation with many of our major contractors but we trust this overview will be of assistance.

This submission has been prepared in conjunction with Bruce Walsh - senior partner of Steensen Warming - Australia (Pty) a firm of consulting engineers.

Yours sincerely,

Geoffrey Jochelson
Business & Commercial Manager

Improving the Future Performance of Buildings

Input Saving Technologies

This paper is intended to address Input Saving Technologies (IST) and the subset of Energy, and Resource consumption.

In this paper buildings referred to are Commercial and Institutional.

Development Criteria

The Development of a new or refurbished building is predicated by different development criteria, and these may be grouped into those belonging to:

- Owner Occupier
- Non Occupying Owner
- Speculative Developer

The different criteria can be summarised as follows:

The **Owner Occupier** usually requires a building with low recurrent costs, taking a view that the whole of life costs are driven by the recurrent expenditure and this is relatively more important than the capital costs of establishing the building. The recurrent costs are only relatively more important, because most projects have a fixed budget. even if there is some flexibility within that budget. If the Input Saving Technologies increase the capital cost beyond the owner's budget and reasonable expectations. then there may be some further analysis of Whole of Life cost and a value judgement made.

Owner Occupier Buildings include Hospitals. Defence Establishments. and some Corporate head offices, and the building stock is typically designed, constructed, and fitted out expressly for the owner's purpose.

The Non Occupying Owner is not particularly interested in Whole of Life costs that include energy; and resources. The reason for this is that the Tenant or Lessee is responsible for all outgoings under a commercial lease agreement. There has been some pressure from Lessees in recent times to cap outgoings and to establish some certainty before agreeing to a lease over commercial premises. While the Lessors appear to be reacting positively to this issue, it generally precludes the introduction of Input saving technologies unless it can be clearly demonstrated to the Lessor that there is a reduction in capital cost.

Non Occupying Owners include Retail Trusts, Superannuation Funds.

The Speculative Developer constructs a building for the purpose of selling to either an Owner Occupier or a Non Occupying Owner.

There is no motivation for the Speculative Developer to include Input Saving Technologies unless they decrease the Capital cost of the Building or they increase the chance of sales.

Speculative Development occurs most commonly in commercial buildings but can be found in most of the building categories.

Design

It is the Designers responsibility, to provide a building, in response to the Design brief which is suitable for the intended use.

The designer needs to design the building within the clients budget.

The designer may need to undertake options studies to allow the client to decide on the best value solutions for the building. These options studies will invariably include whole of life costs.

The client may have to decide on the relative weighting between capital cost and recurrent expenditure before approving, any of the solutions, and there may be a need for a change to the building budget.

Input Saving Technologies (IST) do not always increase the capital cost of a building, however it has been found in practice that if there is a simple way of achieving a fundamental level of control or implementation, then this will be much cheaper than the solutions found in Input Saving Technologies. This is not to indicate that there is a problem with introducing the IST, only to establish that there may be a need to undertake a whole of life cost analysis to demonstrate an advantage or cost saving.

Recurrent Costs

As a design and IST subset. there needs to be some attention given to understanding recurrent costs.

Labour in Australia is relatively expensive compared to our trading partners. So there is a motivation to reduce the need for constant maintenance attention to systems, plant, equipment, and finishes.

Energy in Australia is very cheap compared to our trading partners.

The recent deregulation of the Electricity and Gas Utilities in Victoria and New South Wales has led to price reductions of up to 50% on energy with no change in usage patterns, consumption, or other Demand Side management strategy; that might assist the utility in providing energy, at a lower cost. The reduction in price then does not reflect a reduction in cost, and is competition driven.

When the whole of life costs are analysed for the introduction of an IST, it is often found that the energy cost saving is small compared to the capital required. With the reduction in energy, prices the whole of life costs reduce, but the payback period for the IST increases. Payback periods of more than 7 years are rarely implemented.

For example. a perimeter lighting control which adjusts for for daylighting components and reduces energy consumption for lighting and air conditioning may have a payback period of 5-7 years simply because the price of electricity has fallen.

The cost of water is very inexpensive when compared to conservation strategies.

For example, there is little incentive to commit additional capital to a Landscape water capture and reuse scheme even in an arid climate area, when the cost of water indicates that the simple payback period is 20 years.

Procurement

There are several methods of building procurement, but this paper will focus on:

- Fully Designed and Documented - Lump Sum contract
- Design and Construct

There are many variations on these themes, which can be explored, but for the sake of brevity; these need to be discussed to flag the issues.

The Fully: Designed and Documented - Lump Sum contract method is characterised by the fact that a Design and analysis has already been provided.

In practice, the contractor is in a competitive bid situation, and needs to find an innovative way, possible to provide a winning edge in the tender.

Where the design includes ISTs these are likely to be implemented if the tender price is below the budget. If the tender cost exceeds the budget, then the ISTs are likely to be removed from the project or downgraded in order to reduce the tender price.

The successful contractor may then attempt to offer alternatives that meet the intent of the design. but at a lower cost. Many of the modern contracts encourage the contractor to submit alternatives, and the subsequent cost may or may not be shared. Invariably, ISTs downgrade or reduce the effectiveness of IST's where they have been designed.

For example, an air cooled air conditioning chiller will provide the function of a water cooled chiller, and at a lower capital cost, but the recurrent cost of the former will be 30% higher. The designer will have considered the whole of life costs, including dosing, location, and acoustics, rather than focusing on the capital costs alone.

Design and Construct

This procurement method responds to a brief which may be minimal in scope and definition or very comprehensive, and it is this variation which leads to different IST results.

If the Brief does not address ISTs in a comprehensive way, there is no advantage to the contractor in implementing them on the project.

Who Benefits from the ISTs?

This is one of the fundamental questions which needs to be addressed. because the answer varies according to the combination of factors outlined above.

The common beneficiary is the greater community who benefits from:

- Reduction in Greenhouse gases
- Reduction in demand for fossil fuels

- Reduction in demand for water
- Reduction in the need for waste water disposal

The Owner Occupier and Lessee will benefit from a reduced expenditure basis only. As the issue of IST implementation is independent of cost, then the benefit to these 'users of the inputs' is marginal at best.

What does this mean for ISTs

There need to be minimum performance guidelines established for buildings that are enforceable through more than simple energy costs before developers will react to IST implementation. Designers will follow the legislated codes and standards as part of the brief, and to mitigate their risk of being sued for negligence.

At present there are Building Guidelines, and Energy Management recommendations, but there are no risk/reward systems which apply to the new building market.

This is not to imply that the introduction of building performance criteria is trivial or that legislation can be developed quickly.

Building Performance Indices have been developed worldwide using methods as diverse as predictive mathematical modelling, historical correlation, and best practice benchmarking.

Benchmarking appears to be the most appropriate if a significant correlation can be established.

IST introduction and implementation in the current low energy price market will need to be encouraged by government, if it is serious about the greenhouse effect and the reduction in demand for fossil fuels, and water resources.

ATTACHMENTS

Power to Change in '99

DBIA President Highlights Trend to Design-Build

Performance Contracting: Not for the Timid

Glavinich Enlightens Conferees on "Meeting the Challenge of Design-Build"

Available for inspection at the Productivity Commission libraries in Melbourne and Canberra or purchase from Expo Photo Bition (contact details on submission order form available from our website).