

Articles

Sustainability is Survivability.

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As we move further into the 21st century the impact of climate change is becoming more noticeable to the general public and more serious in its impacts on our way of life.

Climate change is a result of our contempt for our "Natural Capital" and the resultant unbridled demand for energy. This demand is maintained by our limited awareness and understanding of the consequences of our increasing demands on these limited resources.

We are facing our second industrial revolution - abundant people but limited resources.

A smart capitalist always reinvests in his capital. Letting it run down through overuse, caused by ignorance of the importance of the capital resource to a successful business, is a myopic view of the symbiotic relationship between the capital resource and profitability. This is a recipe for disaster for any economic capital model - and this is what is happening in our relationship to Natural Capital. The result is disastrous climate change and the consequences are only just beginning to impact. Our recent sweltering summers and available scientific data illustrate what is in store, so the quest for workable solutions is urgent.

The Federal Government (and state governments to a degree) has fortunately finally woken up to the effect of climate change on all areas of our environment and subsequently our standard of living and long-term well being. It has now legislated to try and assist with the reduction in global warming and has made certain undertakings on the world stage regarding reducing green house emissions. One of these undertakings is occurring via the Building Code of Australia (BCA).

The BCA is implementing new changes to the design of buildings (including 9a and 9c) in order to assist in this process and these become legislation on 1st May 2006. All new and refurbished or renovated buildings Australia-wide are going to have to comply with changed BCA legislation that reduces the demand on natural capital and therefore reduces the production of green house gasses by improved design, construction standards and processes.

However, it is not all doom and gloom. There are powerful, effective methods available to us all to reduce our impact on natural capital (and therefore the greenhouse effect) while complying with the ensuing legislation and even exceeding it, and at the same time improving profit and amenity! How? By understanding and implementing Sustainability on any project.

Many lay-people, and even many within assorted professional industries, may automatically associate sustainability concepts with alternate or 'greenie' philosophies and practices. But this is not a "tree-hugging" exercise - it is a system that with appropriate knowledge can offer significant reductions in the bottom line of costs while at the same time significantly improving the negative affects on the environment and amenity /comfort of any facility. Surely a win /win situation.

Sustainability can offer significant proven savings in energy costs, water costs, building costs, lifecycle costs, running costs and labour costs whilst greatly improving value with a minimum initial outlay.

Research by the BCA for the new regulations coming into force in May 2006 indicates the following:

- *The building sector is one of the fastest growing sources of greenhouse emissions – 21% of Total (RIS for increasing Energy Efficiency of Housing, Feb 12, 2006)*
- *The DTS provisions of the BCA add relatively little to construction costs- between .06% - 2% (RIS for increasing Energy Efficiency of Housing, Feb 12, 2006)*
- *The cost of DTS provisions is substantially offset by savings in HVAC plant and in a number of cases delivers a net reduction building cost (RIS for increasing Energy Efficiency of Housing, Feb 12, 2006)*
- *A 5 star building (NATHERS) uses up to 30% less energy than a 4 star building. (RIS for increasing Energy Efficiency of Housing, Feb 12, 2006)*

Practical sustainability has many examples of significant improvement in all profit and amenity outcomes.

The new ING insurance headquarters in Amsterdam was designed and built as a green building in 1987.

It featured an integrated design team process, passive solar heating and ventilation, day lighting, water efficient landscaping and rainwater capture. They achieved a 92 % reduction in energy used compared to a conventional building of similar size ,which results in \$2.9 million (US) per year saving on energy costs.!

The energy efficiency features themselves were paid back in just three months.

Absenteeism decreased by 15% over the previous head quarters building and productivity was noticeably improved. (RMI- Green Building case studies 2005)

The US Dept of Energy, indicates numerous examples of significant energy and related cost savings in buildings with a sustainable infrastructure of over 50 per cent of the base cost of energy use per year, major improvements in productivity, and decreases in absenteeism of 15-20 % over all types of facilities (US Dept of Energy 1998)

As you can see, sustainability is survivability.

What is sustainability?

Sustainability is the practice whereby the demand on capital resources is significantly reduced through appropriate analysis based on an integrated systemic overall approach to facility resource use. This approach is then incorporated into those facilities.

This results in inefficiencies being identified and removed from the demand cycle.

This is not just an action - it is a philosophy, a way of thinking, being and understanding the issues that accepts the logic behind sustainable practice and incorporates it into the total company philosophy.

“Efficiency creates wealth” or conversely “inefficiency wastes money”.

No business can survive if it wastes money. This approach is relevant to all types of commercial and residential facilities alike including: aged care, hospitals, shopping centres, manufacturing process, entertainment, infrastructure and housing projects.

Sustainability is about reducing these loads on natural capital, thereby improving profitability and environmental outcomes through:

1. Integrated system design and whole system thinking
2. End use-least cost analysis principles
3. Efficient and energy and human resource management
4. Practical and innovative sustainable practices
5. Understanding and implementing the four principles of “Natural Capitalism”.

Why Sustainability?

This integrated approach to sustainability results in the following benefits:

1. Improved profit due to:

- significantly reduced running costs due to more efficient usage of natural capital resources such as power ,water, and the related infrastructure that drives the demands on these resources
- improvised integrated building envelope and internal fit off design reducing thermal and acoustic loads, improving worker efficiency, increasing resident appreciation due to improved comfort and therefore increasing value
- reduced authority approvals time and costs by advocating and incorporating sustainable principles
- significantly reduced water use costs due to rainwater capture, improved water use practice resulting in decreased demand for water, water recycling and low water gardens etc

- reduced lifecycle costings due to improved system design, reduced loads on equipment ,better specified and therefore smaller ,more efficient and longer lasting equipment
- reduced maintenance/repair costs due to less wear and tear on equipment caused by reduced demand on equipment or reduced amount/smaller/better specified equipment
- improved functionality resulting in reduced labour requirements/costs and improved labour outcomes/improved system efficiencies
- reduced absenteeism and lost time due to improved working conditions
- improved staff productivity because of a healthier working environment
- increased demand for facilities due to the improved amenity for residents. This results in less advertising costs ,less resident vacancies and down time
- reduced rubbish and associated costs due to improved recycling and reduced waste due to designs of systems and operations replicating “bio mimicry systems.” (Systems based on the natural concept of “no waste” closed loop systems- all production being used)
- improved building practice /design /process/materials quality resulting in reduced building and system waste, rework, maintenance.

2. Improved amenity for residents due to:

- improved building envelope and fit off design resulting in improved living conditions.
- more natural lighting improving reading conditions and reducing negative affects of artificial lighting such as glare and associated negative visual impacts.
- more thought given to residential functionality resulting in more joyous and harmonious living atmosphere.
- reduction in toxic products being used such as paints, internal finishes, materials, carpets etc.
- improved comfortability due to reduced heating and cooling requirements and the resultant improved equilibrium of temperature.
- more comfortable environment due to the improved functionality of design based on residents and staff requirements.
- use of bio-philic concepts in design parameters where possible bringing residents into closer contact with natural systems –proven to improve health outcomes (*Ulrich RS 1990- Effects of Nature and Abstract Pictures on patients recovering from open heart surgery.*)
- fresher air ,cleaner water ,more peaceful environment.
- improved relationship between staff and patients.

- improved acoustic outcomes due to super efficient windows and insulated building envelopes.
- less stressful and more relaxed environment benefiting residents and staff.

3. Improved environmental outcomes due to:

- water recycling and waste water recycling.
- innovative, coordinated and cost effective building design resulting in improved building envelope and fit off outcomes reducing thermal and acoustic loads.
- reduced power/energy demands resulting in decreased contribution of CO2 and other green house gases.
- reduced loads on the sewerage system and stormwater system.
- reduced loads on machinery thereby reducing demand for inefficient production practices for that machinery.
- reduced demands on natural capital due to recycling, waste awareness, and bio mimicry.
- reduction in the related supply chain loads caused by the reduction in end use loads due to the improved efficiencies resulting from end use least cost analysis.
- improved labour efficiency resulting in reducing waste and downtime.
- improved productivity due to less maintenance costs.

The important thing to remember is that sustainability must be cost effective. If it is not, nobody will use it. Even though it has great benefits for the residents and the environment, if it costs more to implement without any cost benefit then it is in itself not a sustainable practice. Also, it must be a system that, whether we like it or not, appeals to the financial bottom line.

Sustainability must be practical.

Even “not for profit” operations must be aware of this issue, otherwise they will reject sustainable practice as redundant as they cannot afford to operate in a sustainable way if they are running at a major loss. Of course, this can be avoided by ensuring that sustainability is practical.

Sustainability is a practice that is more cost and result effective the earlier it is implemented into an integrated system of design and operations. In any project, 90 percent of all costs are decided on the first day. The effectiveness and value of any decision, not just sustainable ones, are lessened exponentially the later a decision is implemented into the project cycle. (e.g.: adding an extra room once the building is finished or increasing or changing the productivity requirements once the factory is complete is obviously disproportionately expensive)

Those first decisions can have enormous bearing on the success or failure of a project.

If sustainability as a direction is agreed with on day one then the benefits are significantly increased. There are many

benefits to be gained from implementing sustainable practice at any stage of development but the most benefit is gained if incorporated at the beginning of the process in an integrated, coordinated manner.

Appropriate management of the overall integrated system is required to ensure all stakeholders needs are examined and understood and wherever possible are taken into account for successful sustainable implementation. This way all the relevant design team members and stakeholders, including operations staff, can be included in the process resulting in an integrated system based on understanding and outcome.

It is important to note there is minimal benefit in trying to improve sustainability by reducing running costs with stand alone, non- integrated processes. The installation of such items as a solar hot water heater on a roof of a building with no sustainable infrastructure is not going to provide the results you need to validate sustainable practice. It will not be a cost effective exercise, as it is not an integrated component of a sustainable system and as a stand alone and consequently inefficient component it will not have the desired result. As a consequence, its comparative ineffectiveness will eventually persuade management that sustainability is a waste of time.

Sustainable practice is not about achieving massive reductions in power usage or water recycling cost through single non-integrated items which are not repayable or economic over the short to medium term.

Big savings can be cheaper than smaller savings.

Sustainability is at its most fulfilling and beneficial when the system is integrated and coordinated. Minor concessions, such as just replacing the light globes in your facility with energy efficient types, do help of course, but much more advantage could be gained by a more integrated initial design or retro fit concept for a similar outlay but with greater results.

Sustainable practice is about trying to achieve smaller reductions in power and water usage, for instance, over a raft of integrated areas .Achieving 20% reductions over 5 or 10 areas of operations will result in a 100-200% improvement in sustainable outcomes rather than trying to achieve 100% reduction in environmental loads through one item in one area. This is practically unachievable and will not result in the desired sustainable outcome. If the aim is for massive sustainable outcomes over a limited number of avenues the outcome will be disheartening.

The results from sustainable practice can be quite significant for a small outlay.

In a recent and new \$9 million Aged Care, “not for profit” project of 90 high and low care beds in Sydney, we increased the size of the Stormwater detention tank required by council by about 300% at an extra over cost of about \$4,000 and then at a cost of around \$11,000 we returned the water from the tank into the toilet system.

Based on water consumption figures from the previous 60 bed nursing home on the site we will save approximately \$1,500 per month in water bills. This means the system will pay for itself in about 11 months and from then those savings come off the financial bottom line.

This system was implemented into the design at quite a late stage in the process and shows how beneficial sustainability can be for relatively small investments.

In another example we spent \$23,000 on high efficiency, long life globes throughout the complex which, based on energy costs from the previous nursing home, will pay for itself in 2 years and then save around \$1200 per month in energy bills for that item alone. There are also reduced labour costs for monitoring and maintenance, reduced capital lifecycle costs including managing and buying globes over the longer term, improved lighting outcomes for staff and residents. This is due to clearer, stronger lighting colour and definition as well as improved lux levels and a reduced number of actual lights. Just these two simple concepts will improve that business's bottom line by around \$25,000 per year after 2 years, providing more funds to be cycled back into the development to be used for patients' amenities or even more improved sustainable outcomes.

It is important to note these concepts were introduced very late in the design process and were not as integrated, and therefore as beneficial, as they could have been had sustainable practice been considered on the first day of project inception.

Another area to consider in sustainable practice is the importance of getting the most impact from what you are implementing. Although the initial cost of an item may be higher it may allow greater savings in other areas. This will significantly add value to the cost of the item relevant to the reduction in costs of other related items within the system.

The use of Super Windows (triple insulated glass) for example can result in the following benefits

1. increase the amount of light into a building resulting in decreased electrical lighting requirements in daytime, including capital costs of lights etc
2. improve daytime heat storage in winter/cooling in summer to reduce heating/cooling requirements
3. reduces construction costs due to smaller HVAC infrastructure (heating /cooling) and improved efficiency of structure due to increased space released by reducing or eliminating HVAC fixtures
4. reduced maintenance costs and capital outlays due to reduced heating and cooling requirements
5. reduced energy costs due to improved thermal values of the windows and reduced artificial lighting requirements
6. improved daylighting performance resulting in the proven benefits for residents and staff that daylighting brings over electrical lighting (US Dept of Energy Report 1998)
7. improved noise suppression

8. improved heating and cooling at perimeter zone areas
9. reduced need for curtains to provide thermal/acoustic balance at window openings
10. increased design scope due to more glass being able to be used
11. reduce significantly the loads/energy requirements on HVAC reducing or eliminating the needs for same
12. improving amenity and comfort by bringing the residents closer to the natural environment by using more glass
13. improving the productivity of staff as they are working in better environment
14. reducing staff absenteeism due to improved working conditions and happier environment
15. increased demand for the facility by prospective residents due to the overall benefits the residents experience resulting in reduced marketing costs and less down time in rooms.

This example suggests that if we properly count multiple benefits and take credits that are real and measurable in rigorous engineering-economic terms we will very often find that one way to make a building inexpensive to construct and run is to install initially more expensive but ultimately sustainable windows. This is not the usual value engineering approach of squeezing dollars and cents out of each component separately, but is utilising our money in a highly integrated fashion to place greater investment in some areas in order to reduce expenditure in others.

Just making a building the right shape and pointing it in the right direction for solar orientation is enough to save one third in energy use. (A.S.H.R.E.A Journal, June 1995)

The use of sustainable practice for all buildings is the way of the future and the facility that embraces this concept will gain the competitive advantage. Sustainable practice is not a complicated premise, but a logical engineered practice that has proven results.

After reviewing what has been outlined here it is important not to lose sight of the benefits it provides to all stakeholders, particularly the residents we all care so much about in our aged care developments, our hospitals, and our retirement villages.

It is here we can really highlight the benefits of sustainable practice and assist the most deserving of people – our residents.