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The Business Case for Sustainable Design – the City of Melbourne CH_2 Project

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ABSTRACT

The City of Melbourne's landmark building development project, referred to as Council House 2 (CH_2) is to be completed during 2006. CH_2 is a world leading six star environmental building incorporating sustainable technologies and producing financial, environmental and societal benefits. The business case for sustainable design within the context of CH_2 is examined. An overview is carried out of traditional business case decision making tools used in the context of property development. The case for the design and construction of ecologically sustainable buildings is considered. The CH_2 project is reviewed in detail and the "triple bottom line" business case model developed by the City of Melbourne, which underpins the development, is investigated. It is concluded that the CH_2 development should deliver diverse benefits to all stakeholders; the Council, staff, business and ratepayers. Further, the business case model developed by the CH_2 project can be utilized as an exemplar for other developments.

Keywords: business case, payback, green building, productivity.

CAVEAT

This paper is based in part upon documentation provided by the City of Melbourne for the purposes of undertaking the study. It should be noted that certain documentation was unable to be provided due to confidentiality and legal requirements. This report must therefore be regarded as limited, to the extent that such documentation has not been considered in its compilation.

INTRODUCTION

As a result of the challenges currently facing the world's environment, such as climate change, desertification, pollution and the extinction of various species of flora and fauna, society is increasingly looking beyond economic progress to achieve sustainability in order to preserve the environment for future generations. Motivated by the realisation of the negative impact of development upon the environment, the concept of ecologically sustainable development (ESD) has steadily gained credence.

ESD is most commonly defined as:

- *'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Brundtland Commission Report, 1987);* or
- *'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased' (Australia's National Strategy for Ecologically Sustainable Development (NSESD), 1992).*

With the increasing level of education and awareness about the threats to the environment and the importance of its preservation for future generations, there is a growing emergence of ESD buildings throughout the world (Robinson, 2002), given that buildings are a prime emitter of greenhouse gases. In Australia, buildings are responsible for 30% of all raw materials used by society and they consume more than 40% of all energy produced, causing more than 40% of all air emissions (AGO, 1999). Development will not be sustainable if the economic constraints under which the property development process operates are not considered. There is a common perception that there is no demand or support for sustainable development (Kam et al., 2002). However, the impact of buildings on the environment requires that the property and construction industries contribute to the ESD culture.

The relationship between benefits and costs is commonly assumed to be a major obstacle to the uptake of sustainable development (Kam et al., 2002). The property and construction industry and its clients tend to focus on short-term gains rather than long-term savings or investment opportunities. Perceived higher initial construction costs and maintenance costs are major obstacles, as they reduce profitability. The anticipated additional cost of ESD features is a reason for the perceived indifference of clients to environmental issues.

In Australia, concern for initial costs is reinforced by the involvement of a number of actors in different phases of building delivery, from development, through ownership to occupation of structure. Energy efficiency, for example, is not considered a high priority for potential tenants and the emphasis industry puts on initial costs versus life cycle costs militates against ESD considerations.

Inappropriate financing models which focus predominantly upon immediate financial return, or lack of access to capital, discourage investment in sustainable buildings. There is also no incentive to act, when often the investor is not the ultimate user who is responsible for energy bills. In addition, energy, like other business related expenses, is tax deductible and the plant and equipment that uses energy can be depreciated against taxable income. Lenders of capital neglect environmental costs in their assessment frameworks.

The property market continues to be unsure about the benefits of ecologically sustainable development and accordingly ESD is not usually reflected in the property valuation and analysis process. Using the concepts of price and worth, an outline valuation process is developed to assist the valuer to take ESD into account through rent, capital growth and psychic income. Research has shown that lessees are prepared to pay 5% to 10% higher rent for improved comfort and control of the environment (Maguire and Robinson, 2000). Analysis of market evidence has shown that a psychic element of income can increase prices paid for properties by reducing the initial yield (Baum and Crosby, 1995). Taking all of these elements of return together, a property exhibiting the highest environmental design and management principles can achieve a substantially improved property investment worth. These remain to be reflected in the general approach to estimates of market price.

It is common for investment valuations to be prepared in association with market valuations, the former by discounted cash flow (DCF) and the latter by capitalisation. It has been common to adjust the investment variables in the DCF so that both methodologies provide the same result. This tends to suggest that price and worth are identical (which would be so in a fully informed market in equilibrium and is certainly so for a buyer in that market). But reference to any of the financial markets dispels this notion; transactions occur as a result of differing opinions about price and worth and this is of significant relevance to property.

Sales evidence may be analysed and its results used to value a comparable property in the normal way. But this reflects what the market ***has been*** paying for comparable properties; it does not necessarily reflect the normative solution, i.e., what it ***should have been*** paying.

The development of the City of Melbourne's (CoM) new staff accommodation, Council House 2, or more simply "CH_2", is a significant example of an ESD building. Due for completion in 2006, it has achieved six star world leader certification from the Green Building Council of Australia, the national body whose role is to define and develop a sustainable property industry in Australia and to drive the adoption of green building practices through market-based solutions.

The CH_2 building incorporates many innovative sustainable technologies in its design, including:

- phase-change materials for cooling;
- undulating concrete ceilings for passive cooling;
- rooftop solar panels powering a façade of louvres and hot water;
- automatic night-purge windows;
- solar shading;
- shower towers for cooling;
- co-generation power plant;
- sewage water recycling plant;
- wind turbine extraction fans;
- green roofscape; and
- glare control.

As with any development, the CH_2 project was required to be deemed feasible before it could proceed. Such feasibility studies are often referred to as business cases for taking a particular course of action. The aim of this paper is to examine the business case for the sustainable design of buildings by specifically considering the case-study of the CH_2building. In this respect it is hoped to serve as an exemplar for proposed ESD projects in general, and similar developments in particular.

The paper commences with a review of business case decision making tools used in the context of property development, and then considers the case for the design and construction of ecologically sustainable buildings. The paper then investigates the CH_2 project in detail and analyses the "triple bottom line" business case model developed by the CoM which underpins the development. The paper concludes that the ecologically sustainable CH_2 building will deliver diverse benefits to all stakeholders; the Council, staff, business and ratepayers and this is illustrated by comparative feasibility studies.

BUSINESS CASE DECISION MAKING TOOLS

The business case is a key element in the decision to build. This is because the decision to build is concerned not only with the overall philosophy of the ownership entity and whether the commitment of resources is in line with the aims and objectives of that entity, but also with the overall financial viability of the proposed project (Brown and Matysiak, 2000). The business case involves various property development economic decision making processes, and mainly focuses on tangible elements such as return on investment, cost of capital, hurdle rates, worker productivity, energy costs and long term operational and maintenance costs (Morton, 2002). It may also include other considerations such as company brand strategy, company culture and the quality of the work environment.

The fundamental principle of development economics and business case decision making is that the total benefits created are (at least) equivalent to the total costs incurred (Robinson, 2004b). Therefore all forms of development economic appraisal are a form of cost-benefit analysis. A cost-benefit analysis compares the cost and the benefit of a given measure to evaluate if the benefit outweighs the cost (Kwong, 2004). Examples of costs involved in property development include the cost of initial land and construction, and the future cost of maintenance and operations. Benefits include enhanced property values realised through sales or rentals, and enhanced production processes of the eventual occupiers of the building. The range of costs and benefits considered is often determined by the investor's viewpoint of the development. Developers with short term return time frames may simply be interested in initial capital costs of developments and sales values, whereas longer term owner-occupiers may also wish to consider the operational costs and benefits of the proposed development. Further, investors may also wish to consider the effect of their development upon external stakeholders in the community.

Some of the common forms of cost-benefit analysis used in the property industry are considered below.

Residual analysis

This is the simplest form of analysis used within the property industry, and it essentially evaluates the difference between the project costs and revenues to arrive at a residual figure which may represent either the profit or the land value (Brown and Matysiak, 2000). This is illustrated in the following formulas:

- Profit = Net Development Revenue – (Land cost + Development cost + Interest cost).
- Land Value = Net Development Revenue – (Development cost + Interest cost + Profit).

As illustrated above, the profit of the proposed project can be estimated using this method, or alternatively the analysis can be used to provide an indication of how much to pay for land to achieve the desired profit. The residual analysis is a simple, static model for business case decision making processes, which considers only the initial cost and return of development. Indeed, there is an explicit assumption within this method that the value will be realized (through sales) only upon completion of development. Whilst this may be applicable for speculative type developments, it is not the case for owner-occupied type developments, such as those undertaken by government. Further, residual analysis does not take into consideration operational costs and benefits of buildings throughout their life-cycle.

A comparative residual analysis for the proposed CH_2 development project is illustrated later in the paper.

Return on investment

The return on investment (ROI) approach is a method of estimating the profitability of the project as a percentage of the capital outlay or investment. It is in effect an extension of the residual analysis and is calculated as follows (Brown and Matysiak, 2000):

- Return on investment based on the gross profit

  ROI = Gross profit / Total Cost.

- Return on investment based on the total rent received

  ROI = Rental income / Total Cost .

Based on the above calculation methodology, a project may be deemed acceptable if the return on investment is greater than an agreed or preset target return, often referred to as a "hurdle rate".

ROI can also be reconfigured to determine what a likely or appropriate investment outlay or value should be. In this case, the above equation for rental is re-written as:

- Total Cost or Investment = Rental income / ROI .

In this scenario, the ROI is often referred to as the capitalization rate, or the rate at which income is capitalized. Direct capitalization, as this method is known, is a common approach for valuation of income producing property (Robinson, 1989).

Both the return on investment and direct capitalization methods are, like residual analysis, static methods of feasibility analysis. That is, they analyse the asset only at a given point in time, often only considering the value that is realized upon sale or letting at the completion of construction. Dynamic methods of project appraisal, which consider the project over a given time frame, are now considered.

Payback period

The payback period of a project is defined as the number of years required to repay the initial investment from its future cash flows (Whipple, 1995).

Payback period is a simple analysis to estimate the time taken for cash inflows to equal (or payback) the original capital outlay. The choice of project, or whether to proceed with a project, is made on the basis of some agreed cut-off period, whereby a project with a payback period less than the cut-off period is accepted (Brown and Matysiak, 2000). Payback period provides an indication for investors as to how long it will take to recover an initial capital outlay, thereby estimating the liquidity of the project.

A variation is the discounted payback period. This approach is the same as the previous method, although it takes into account the time value of money, by discounting the future cashflows to reflect their present worth. The discounted payback period is therefore the time it takes for the discounted cash flows to equal the initial investment (Brown and Matysiak, 2000).

Net present value

The net present value (NPV) is defined as the present value of an investment's future net cash flow, less the initial investment (Brown and Matysiak, 2000, p.6). The NPV is effectively an adaptation of the payback period method to determine if the future cashflows return the initial cash outflow at the target discount rate during the investment period.

A project is deemed acceptable if the net present value is greater than zero when discounted at the target discount rate. In other words, a positive net present value indicates the inflows outweigh the initial investment and the project would appear feasible at the target discount rate and investment period. Conversely, a negative NPV would indicate the inflows do not match the investment and the project would not appear feasible.

Internal rate of return

The internal rate of return (IRR) is an extension of the NPV method. Whilst the NPV simply identifies a yes/no scenario for a given cashflow and discount rate, the IRR determines the actual discount or percentage rate that a cashflow is returning to equate to the initial investment. This is the discount rate that equates the present value of the net cash inflows of a project with the present value of the capital investment. As such the discount rate is akin to a rate of return. A project may be deemed acceptable if the IRR exceeds the opportunity cost of capital (Brown and Matysiak, 2000), or other yardstick as determined by the investor. Quite often this is determined as the "risk-free" rate (in Australia the 10 year government bond rate is a common proxy), plus an allowance for risk as determined by the nature of the project. The internal rate of return is a dynamic method of project appraisal, and the discounted cashflow upon which it is based can be as simple or complex as required or as the inputs allow. The internal rate of return method can also be used to determine what initial capital investment is required to equate to a future set of cashflows at a given rate of return or discount rate. To this end it is often used in the valuation of property. (Robinson, 2004b).

In practice, the NPV and IRR methods can be utilized at different levels to undertake a financial lifecycle analysis of a complete project, of an element of a project (e.g. a roofing system), or of an individual component of a system (e.g. a hot water boiler). This is often termed life cycle costing, but terminology also includes life-cost, recurrent cost, cost in use, operational cost, occupancy cost, ultimate cost and terotechnology (Langston, 2005).

Life cycle costing is an evaluation method which takes into account relevant costs over time of a building's design, systems, components, materials and operation. It incorporates initial investment costs, future replacement costs, operation and maintenance costs, and salvage and resale values, adjusting them to a consistent time basis and combining them in a single cost-effectiveness measure that makes it easy to compare alternative projects (Langston, 2005). Life cycle costing can also be undertaken in terms of energy and greenhouse gas emissions rather than costs (Robinson, 2004a).

Social cost-benefit analysis

Whilst the above methods of cost benefit analysis are predominantly used to evaluate the financial impact of a development in terms of private cost and benefits, the business case for development can also be expanded to include the social costs and benefits affecting the external stakeholders of the project. Examples of the various social costs and benefits of property development include:

- Social costs – increased traffic congestion, creation of adverse micro climate, environmental effects and overloading of infrastructure.
- Social benefits – contribution to wealth accumulation, provision of employment opportunities, urban renewal and growth, pollution reduction and ecologically sustainable development (Robinson, 2004a).

A social cost–benefit analysis will often take the form of a planning balance sheet which concentrates on the direct impact of development on different interest groups and community sectors (Snell, 1997) and thus may include non-financial factors, or recognize equity considerations in development business decision making processes. The goal achievement matrix is another form of social cost–benefit which attempts to prioritize the objectives of a development across all stakeholders and then score each proposal based upon the pre-assigned weighting. Both the planning balance sheet and goals achievement matrix analysis are limited by the subjective judgment upon which they are inevitably based.

THE CASE FOR ECOLOGICALLY SUSTAINABLE BUILDINGS

Whilst the foregoing business case decision making tools can be used to evaluate ESD buildings, they have generally not been used, or used inappropriately. ESD buildings by their nature must be considered over the entire life span of the development, not simply the design and construction stage. Therefore, a whole of life or life cycle cost approach to the evaluation of ESD buildings is appropriate. In simple terms, this is because increased investment in sustainability features of building design can be offset by reduced running costs and potential productivity gains during the occupation of the building. Concentration predominantly on increased capital costs of development for ESD buildings, and use of static business case analysis tools which support this view, leads to inappropriate or inadequate consideration of the intoto development.

The presumption that ESD buildings "cost more" needs to be considered further. The perception that sustainable design and construction inherently contains a substantial cost premium is considered one of the main barriers to ESD (Flynn, 2003). Due to the fact that the construction industry and its clients generally tend to concentrate on short-term gains rather than long-term savings or investment opportunities, this perception that ESD buildings equal higher initial construction costs and maintenance costs is a major obstacle as this reduces the profitability of the project (Robinson, 2004a). Indeed, six Californian property developers interviewed in 2001 estimated that green buildings cost 10 to 15% more than conventional buildings (Berman, 2001). In terms of capital development cost, there is a dearth of published information as regards the cost premium of ESD buildings. What information is available tends to support the contention that ESD buildings require additional capital expenditure. Exactly how much extra depends upon the level of sustainability measures introduced, although there are some broad guidelines that can be deduced from the information available.

The International Netherlands Group (ING) Bank in Amsterdam completed in 1987 is perhaps a pioneer in this field, with passive solar heating and ventilation, cogeneration and waste heat capture, daylit office space and interior cores, rainwater usage etc. The additional cost of these features is estimated at approximately 2% of the development cost (Rocky Mountains Institute, 2004). The more recently completed 60L Building in Melbourne, arguably the "the premier green building in Australia" (The Green Building Partnership, 2004), is believed to have carried a capital cost premium in the order of 5%. An analysis of 33 projects certified as "green" by the United States Green Building Council (USGBC) found on average the capital cost premium is about 2%, although this premium varied from 0.66% for level 1 certified buildings, up to 6.5% for level 4 (highest) certified buildings (Capital E, 2003) . A further study conducted in the United States by Davis Langdon compared the cost of 45 USGBC certified green buildings with 93 conventional buildings. This study found that that there was no significant difference in the construction costs between the two categories of buildings (Davis Langdon, 2004). This is not to say that ESD buildings will not cost more. The Colorado Court energy and resource efficient affordable housing project in California, estimated that the project's special energy measures cost in the order of 12% of the total construction cost (Global Green USA, 2004).

Yet there is a large body of evidence which suggests that ESD buildings, whilst having an initial capital investment surcharge, will repay this investment many times over in terms of lower energy and operational costs. The ING bank cost premium payback period was just three months and the annual savings of US $2.9M continue. The building uses a tenth of the energy of its predecessor, and a fifth of that of a conventional new office building in Amsterdam. (Rocky Mountains Institute, 2004) The Four Times Square development in New York was completed in 2000 and considered *"the first skyscraper to embrace standards of energy efficiency, indoor air quality, and sustainable materials use."* is expected to have operational costs some 10-15% lower than a comparable project. The energy efficiency measures are estimated to have a payback period of three years (US Department of Energy, 2004). A report to California's sustainable Building Task Force, touted as *"the most definitive cost benefit analysis of green building ever conducted"* concluded that that minimal increase of capital investment of approximately 2% to support green technologies in buildings would, on average over a 20 year period, result in life cycle savings of 20% of total construction costs. Of these savings, approximately 30% (6% of total saving) emanated from reduced energy and resource usage, and 70% (14%) from increased production productivity and health values (Capital E, 2003).

The issue of productivity and ESD buildings is an interesting one. Whilst the original thrust of ESD buildings focused predominantly around greenhouse gas emission reduction and associated energy cost savings, more recently the relationship between the internal building environment and production productivity has commanded attention. Presently, there are difficulties in relation to measuring the value of productivity as a function of building environment, due to the complexity of the many factors which contribute to the way human beings function. Whilst energy efficiencies can be measured fairly precisely, productivity of building inhabitants tends to be less certain (Capital E, 2003). Nevertheless, there is a strong band of case study evidence to suggest that improved building environments support increased productivity.

The renovation of the Reno Post Office in Nevada, undertaken with the objective of reducing energy costs, also heralded a 6% increase in worker productivity (Smith, 1999). The Pennsylvania Power and Light Company incorporated task lighting for their drafting staff. The effect was to reduce energy bills by 73% which in itself produced a return on investment of 24%. But quicker drawing production times, coupled with increased quality and accuracy of work, reduced sick leave and improved worker morale, combined to produce a return on investment of over 1000%. (Smith 1999). After PNC Realty Services operated from a new "green" certified building in Pittsburgh, one of the Directors described the benefit of the new facility in terms of productivity and staff – *"people want to work here, even to the point of seeking employment just to work in our building... absenteeism has decreased, productivity has increased, recruitment is better and turnover less"*. (Green Building Alliance, 2002). These benefits are considerable. Research conducted by Advanced Environmental Concepts found that the cost of sick leave remuneration in Australia in 2000 (excluding cost of replacement staff, disruption of production, etc.) was estimated to be $1550 per employee, whilst the cost of replacing employees, or staff churn, is estimated to be anywhere from 29 to 130 percent on an employee's annual salary (AEC, 2003).

But these benefits do not necessarily end with increased productivity and a happier workforce. The ING Bank credits its rise from No.4 to No.2 bank in the Netherlands with the new image the building has presented to the public (Rocky Mountains Institute, 2004), thereby giving rise to an opportunity to include psychic income. Psychic income provides an element of return brought about by the benefits of owning and operating a socially desirable asset. This is similar to the benefit of owning a "trophy" property, a sentiment that is recognized by the market usually by the medium of a firmer capitalization rate. It follows that the benefits of ESD should be recognized by the market and reflected in appraisal methodologies as the ESD culture becomes more widely adopted, and the benefits of ESD buildings more clearly understood.

So the issue of productivity and performance in ESD buildings can include many dimensions including reduced staff absenteeism and turnover, increased production output and quality through employee comfort and enthusiasm, to improved organizational branding and public perception. Whilst these clearly have a financial benefit which, although perhaps difficult to measure precisely, is nevertheless very significant, it is becoming clearer that these benefits represent a watershed for ESD buildings. Suddenly a building becomes an organizational benefit, and the people within them are considered to matter, rather than simply a way of housing an organization (Heerwagen, 2004). ESD buildings are no longer just about reduced emissions or increased productivity, but the people who live and work within them are identified and acknowledged as a fundamental and worthy resource in their own right. And this has another financial benefit – reduced risk to occupiers of the building due to the adverse affects of poor indoor air quality. Clearly this has beneficial implications for the insurance of occupants within ESD buildings and the designers of such buildings. In one notable example, designers of ESD buildings who undertook appropriate training were offered a 10% insurance premium rebate as a reflection of the relationship between design and physical ailments, predominantly due to poor indoor air quality (Mills, 2001).

And thus ESD buildings take on a social dimension, in addition to the financial and environmental perspectives. Such an approach is in line with current trends toward "triple bottom line" reporting procedures. Indeed, it is an apt business case decision making model, and a project deemed feasible under such criteria would no doubt embody the ethos of ecologically sustainable development.

Having considered the main business case decision making tools and the case for ESD buildings, the remainder of the paper is concerned with the CoM case study in particular.

COUNCIL HOUSE 2

Drivers for looking at new accommodation

The drivers which led to a search for new accommodation by the CoM included the following:

- The old accommodation was reaching the end of its functional life, the stage where it no longer meets statutory regulations including occupational health and safety, and disabled access;
- To promote staff wellbeing and effectiveness; and
- To house staff in the same location.

Ultimately it was decided that new accommodation was required, and it would be more effective to be in one building rather than spread over the various Council leases currently in place at the time.

With the need for new accommodation clearly identified, the CoM developed a "triple bottom line" business case for the development with some clear strategic initiatives, which can be classified into financial, environmental and social drivers. Each is now considered.

Financial drivers

The CoM established an investment fund after the sale of the Council's share of the economic entitlement in the electricity supply company, Citipower Ltd., in the mid 1990's. The sale proceeds were $200 million overall and the CoM decided that a portion of these funds could be invested into municipal projects which are evaluated against two criteria:

- Firstly, any project must demonstrate a return of 150% of the 10 year bond rate.
- Secondly, funds can only be used for "strategic" projects (Adams, 2004), i.e., those which promote the growth of Melbourne. This objective is considered further under social drivers.

In addition to the above, the specific financial drivers of the CH_2 project were:

- Low risk, high return investment over a 50 year life;
- To "future proof" or reduce the risks of the accommodation option chosen.

After consideration of a number of different alternative accommodation options, it was eventually decided that the development of the new CH_2 presented the lowest risk to the CoM. The total cost of CH_2 is estimated to be approximately $51 million.

Specific estimated costs for the project are as follows:

- $29.90 million for the base building excluding fit out and sustainability costs;
- $11.30 million sustainability features;
- $2.80 million demonstration and education process;
- $7.1 million council specific requirements.

(Source: http://www.melbourne.vic.gov.au/rsrc/PDFs/CH2/CH2FactSheet.pdf).

The cost of $11.30 million for the sustainability features represents an investment premium of approximately 22% for the project. This is higher than the results of the literature review identified earlier in the paper which found that the cost premium for "green" buildings can be up to approximately 12%, although the majority are lower than this. However, it must remembered that CH_2 has achieved the highest level of ESD certification from the Green Building Council of Australia, commensurate with the substantial

ESD technologies incorporated into the project, and so could be expected to carry a higher than usual sustainability price tag.

Whether the 22% premium is conservative or not is beyond the scope of this paper to investigate, although it obviously impacts upon the financial return of the investment in terms of the sustainability aspects of the project.

	Conservative *		**Optimistic ***	
	Savings ($/yr)	%	Savings ($/yr)	%
Staff effectiveness and well-being improvement	$350,000	51	$1,120,000	77
Energy Savings	$270,000	40	$270,000	19
Water Savings	$60,000	9	$60,000	4
TOTAL ESTIMATED SAVINGS PER YEAR	**$680,000**	**100**	**$1,450,000**	**100**
TOTAL CURRENT ESTIMATED SAVINGS OVER 50 YEARS	**$34,000,000**		**$72,500,000**	
DISCOUNTED TOTAL CURRENT ESTIMATED SAVINGS	**$8.823m**		**$18.813m**	

* These figures are based on 2004 costs of salaries, energy and water. (Source: AEC, 2003)

Table 1: Estimated Savings for CH_2

Life cycle cost analyzes were also conducted for the various ESD features of the project, to estimate their effect on the long-term maintenance and operation costs. Expected savings from reduced energy and water usage, and increases in the effectiveness and well-being of the staff, emanating from the ESD features of the project, were estimated. These are summarized in Table 1.

The conservative figures represent the minimum benefits that are to be expected from the CH_2 building, whilst the optimistic figures represent benefits that could *"feasibly be achieved based on all the research assessed"* (AEC, 2003). Note that the energy and water savings remain constant for both scenarios, reflecting their more certain status in comparison with effectiveness and well-being (productivity improvement). The distribution of estimated savings ranges from 51%/49% (conservative) for the productivity and energy savings respectively, to 77%/23% (optimistic) for the productivity and the combined energy/water savings respectively. The split for the optimistic figures are slightly above the results of the literature review which identified that financial benefits from investment in environmental features in a building would be in the order of 70%/30% for productivity and energy savings respectively. However, given that CH_2 has advanced sustainable features, it is not unreasonable to suggest the savings will be above the norm. The facility management role of the completed and occupied building will be of signal importance in both monitoring and achieving actual savings commensurate with the estimated savings.

Based upon these figures, payback period, NPV and IRR calculations have been performed and are now presented. A discount rate of 7.5% has been used throughout. This represents the stipulated return of the Council i.e. the 10 year bond rate x 150%, using a 5% (rounded) 10 year bond yield as at June 2003 (Source: http://www.rba.gov.au/statistics/bulletin/F02HIST.XLS). June 2003 has been chosen as this was the approximate date of the development of the business case for CH_2. An annual allowance for inflation has been included at 2.1% as the prevailing rate at June 2003, as measured by the Domestic Final Demand Index of the Australian Bureau of Statistics (Source:http://www.abs.gov.au/ausstats/abs@.nsf/0/43742a462f6606ecca256e7d0000264a?OpenDocument).

The conservative figures represent a non-discounted payback period on the premium paid for the sustainability features of approximately 17 years, and a discounted payback period of 41 years, based on a discount rate of 7.5%, as shown in Table 2.

Year	Non-discounted	Cumulative	Inflation adjusted at 2.1% P.A.	Discounted PV at 7.5%	Cumulative
0	-$11,300	-$11,300	-$11,300	-$11,300	-$11,300
1	$680	-$10,620	$694	$646	-$10,654
2	$680	-$9,940	$709	$613	-$10,041
3	$680	-$9,260	$724	$583	-$9,458
4	$680	-$8,580	$739	$553	-$8,905
5	$680	-$7,900	$754	$526	-$8,379
6	$680	-$7,220	$770	$499	-$7,880
7	$680	-$6,540	$786	$474	-$7,406
8	$680	-$5,860	$803	$450	-$6,956
9	$680	-$5,180	$820	$428	-$6,528
10	$680	-$4,500	$837	$406	-$6,122
11	$680	-$3,820	$855	$386	-$5,736
12	$680	-$3,140	$873	$366	-$5,370
13	$680	-$2,460	$891	$348	-$5,022
14	$680	-$1,780	$910	$330	-$4,692
15	$680	-$1,100	$929	$314	-$4,378
16	$680	-$420	$948	$298	-$4,080
17	$680	**$260**	$968	$283	-$3,796
18			$988	$269	-$3,528
19			$1,009	$255	-$3,272
20			$1,030	$243	-$3,030
21			$1,052	$230	-$2,799
22			$1,074	$219	-$2,580
23			$1,097	$208	-$2,372
24			$1,120	$197	-$2,175
25			$1,143	$187	-$1,988
26			$1,167	$178	-$1,810
27			$1,192	$169	-$1,640
28			$1,217	$161	-$1,480
29			$1,242	$153	-$1,327
30			$1,268	$145	-$1,182
31			$1,295	$138	-$1,045
32			$1,322	$131	-$914
33			$1,350	$124	-$790
34			$1,378	$118	-$672
35			$1,407	$112	-$560
36			$1,437	$106	-$454
37			$1,467	$101	-$353
38			$1,498	$96	-$257
39			$1,529	$91	-$166
40			$1,561	$87	-$79
41			$1,594	$82	**$3**
	Payback	**17 Years**			**41 Years**

Table 2 : Payback Period for “Conservative” Estimated Savings for CH_2

Year	Non-discounted	Cumulative	Inflation adjusted at 2.1% P.A.	Discounted PV at 7.5%	Cumulative
0	-$11,300	-$11,300	-$11,300	-$11,300	-$11,300
1	$1,450	-$9,850	$1,480	$1,377	-$9,923
2	$1,450	-$8,400	$1,512	$1,308	-$8,615
3	$1,450	-$6,950	$1,543	$1,242	-$7,373
4	$1,450	-$5,500	$1,576	$1,180	-$6,193
5	$1,450	-$4,050	$1,609	$1,121	-$5,072
6	$1,450	-$2,600	$1,643	$1,064	-$4,008
7	$1,450	-$1,150	$1,677	$1,011	-$2,997
8	$1,450	**$300**	$1,712	$960	-$2,037
9			$1,748	$912	-$1,125
10			$1,785	$866	-$259
11			$1,822	$823	**$564**
Payback period		**8 years**			**11 years**

Table 3: Payback Period for "Optimistic" Estimated Savings for CH_2

No. of years	10	15	20	30	40	50
Optimistic						
IRR	7.01%	11.88%	13.67%	14.81%	15.09%	15.17%
NPV ($'000)	-$259	$3,461	$6,336	$10,274	$12,627	$14,032
Conservative						
IRR	-6.38%	0.82%	3.97%	6.52%	7.45%	7.85%
NPV ($'000)	-$6,122	-$4,378	-$3,030	-$1,182	$79	$580
Energy and Water Savings Only						
IRR	-16.06%	-6.99%	-2.65%	1.25%	2.90%	3.73%
NPV ($'000)	-$8,787.21	-$7,940.64	-$7,286.38	-$6,389.98	-$5,854.59	-$5,534.81

Table 4: Internal Rate of Return for Estimated Savings

Table 4 shows that the optimistic savings return achieves the required June 2003 return of 7.5% pa, (10 Year bond rate x 150%), after slightly more than 10 years and after 20 years achieves a return of 13.67% pa. The return thereafter increases to 15.17% pa for a 50 year investment. The conservative savings figures achieve the required return of 7.50% pa at around 40 years. Hence, based upon both optimistic and the conservative savings estimates, the additional investment of $11.30 million in the sustainability features appears to be viable under the stipulated criteria. The declining rate of investment return over longer investment periods reflects the reduced importance of future values with respect to discounted cashflow calculations. It should also be noted that the above calculations make no allowance for real rises (over and above inflation) in future staffing/energy costs, which would increase the return on the investment for the sustainability features of the building.

Clearly, the estimated savings from the effectiveness and well-being improvement of staff represent the largest potential gain from the project (Table 1). Indeed, without this component of the estimated savings, the additional investment in the sustainability features would not have been viable in terms of the stated return criteria. The IRR of this scenario (energy and water savings of $330,000 pa) only becomes positive after approximately 25 to 30 years (Table 4), and achieves a maximum of 3.73% pa after 50 years – clearly well below the required return criteria, notwithstanding that no allowance for real cost increases of energy and water have been allowed for.

Thus the stated savings for staff effectiveness and well-being improvement are critical to the business case, and as such merit further consideration.

An in depth analysis was undertaken by consultants into potential productivity benefits at CH_2 (AEC, 2003). The study concluded that gains would be achieved as detailed in Table 5.

Possible area of saving for CoM	Annual cost	Estimated % saving to be achieved at CH_2		Estimated $ saving to be achieved at CH_2	
		Conservative	*Optimistic*	*Conservative*	*Optimistic*
Decreased absenteeism caused by office environment	$153,142	90	95	$137,827	$145,485
Decreased sick leave due to injury caused by office environment	$30,628	5	10	$1,531	$3,063
Reduced stress related to work	$122,531	10	15	$12,251	$18,377
Reduced non-work related stress	$122,531	5	10	$6,175	$12,251
Reduced staff turnover due to dissatisfaction with indoor environment	$66,055	10	40	$6,606	$26,422
Improved productivity (gain for each 1% improvement)	$186,950	1	4.9	$186,950	$916,055
			Total	**$351,340**	**$1,121,653**
			(say)	**$350,000**	**$1,120,000**

Source: AEC (2003)

Table 5: Summary of Potential Productivity Gains at CH_2

As acknowledged by the consultants in their report the results are by necessity subjective although based upon the currently available evidence and utilizing existing CoM payroll records as the commencement point for the study for each category.

Clearly the biggest component of the expected gains is the improved productivity itself, which represents approximately 54% and 82% (conservative and optimistic respectively) of the productivity gains to be expected from the CH_2 building, and 28% and 63% (conservative and optimistic respectively) of the overall estimated savings as shown in Table 1. These figures were based upon a total annual CoM wages expenditure of $18,965,000, and the rationale that every 1% increase in productivity will result in a 1% salary saving. The optimistic rate of a 4.9% increase is calculated from research demonstrating that for every doubling of the fresh air (ventilation) rate, the productivity of occupants rises by 1.7% (AEC, 2003). The CH_2 building will deliver a threefold increase of the minimum fresh air provisions required under Australian Standard 1668.2, which is calculated to be worth a 2.9% improvement in productivity gains. A further 1% improvement is added for the quality of air provided by the CH_2 ventilation system (considered to be the best indoor air quality of any HVAC system), and a further 1% improvement is added for improved thermal comfort of occupants (AEC, 2003). The conservative estimate of a 1% increase in productivity is based upon 0.5% improvement for increased quantity of fresh air, and a 0.5% increase in quality of fresh air, with no allowance for improvement due to thermal comfort.

Other potential financial drivers include returns to be gained from the incorporation of retail and car parking into the proposed development. However, no evidence of these in relation to the final design has been obtained and they are therefore not considered further.

Environmental drivers

In addition to the financial returns derived from reduced energy consumption, the CoM is keen to promote itself as a leading "green" organization in Victoria. In order to do this, the CoM has a number of environmental criteria to which the CH_2 project must conform, including:

- Incorporation of the latest ecologically sustainable design features.
- 5 star energy level rating.
- 20% reduction of energy consumed in Council buildings by 2005 (based upon 1996 levels).
- 5% increase in the use of renewable energy by 2005, and 10% increase by 2020.

By comparison with the existing staff accommodation building, CH_2 is estimated to reduce electricity consumption by 85 %, gas consumption by 87%, and water mains supply by 72%. This results in CH_2 using only 13% of the energy consumed by the existing staff accommodation building. Greenhouse gas emissions are estimated to be 64% less than a five-star rated building (http://www.melbourne.vic.gov.au/info.cfm?top=171&pg=1941).

Importantly, the CoM was keen to develop a "lighthouse" ecologically sustainable demonstration project to show how such a development can be delivered and integrated within the community.

Social drivers

The business case for the CH_2 development also incorporates a number of social drivers which emanate from the CoM's local government role. Naturally, the CoM's responsibility to its ratepayer constituency must be considered. The source of funding for the project is a prime consideration. The CoM has reallocated assets within the investment portfolio to streamline the performance of the portfolio, and also to ensure that the project is fully funded by equity resulting in minimal risk to the ratepayers. This funding option allows the CoM to have full control of all aspects of the property, to fully benefit from capital gain, and to have no ongoing rental expenses apart from normal outgoings. In addition, the strategic view taken with the CH_2 provision of healthy accommodation to staff, increased productivity, and the reduced likelihood of civil action against the Council for poor indoor air quality, commensurate with potentially lower insurance premiums.

The CoM also believes the CH_2 redevelopment is an opportunity to develop retail business within the Melbourne CBD, by providing an integrated retail precinct that potentially links the QV development with Collins Street and Federation Square. This is to be done primarily through the incorporation of retail and carparking facilities within the CH_2 building.

Furthermore, the CoM believes that the CH_2 project enables it to provide some leadership and encouragement to the building and property industry in general, and in the Melbourne CBD in particular. To this extent, the project is considered to be a "beacon type project on sustainability" (Adams, 2004), both in terms of its environmental aspects, and also the health aspects for the staff to be accommodated within the building.

The CoM also sees the project as a means of developing its responsibility to CoM staff. It is hoped that the provision of a healthy working environment will promote the CoM as a responsible employer, and as an employer of choice. This in turn is expected to reduce staff churn and provide other financial benefits considered earlier. Further, the business case for CH_2 had genuine acknowledgement for occupant's well-being and employment satisfaction. As the CH_2 business case concludes (AEC, 2003):

"Many studies talk about the increase in productivity. This gives the perception that the outcome is for people to do more with less. This is not the intention of CH_2 or the CoM. Through a great work environment, fresh air, natural light, low emitting materials and greenery, the COM hopes to create a healthy place to work. A place where, at the end of the day, you feel that you have achieved what you wanted – that you have been effective. With the added bonus that you have fewer sick days, less headaches, and feel good while you are at work."

RESIDUAL ANALYSIS OF CH_2

A comparative study of two hypothetical properties, one a conventional office building and the other the CH_2 building having ESD features, is provided to illustrate the potential of this paper. The data used in the study are described below.

Value

Market rental; values for office buildings are currently around $350 per m2 gross effective after allowing for lease incentives. Property economists currently predict a substantial rise in rents (50% or more) over the next year or two. This will be brought about by the removal of the lease incentives to achieve the levels of current face rentals. A gross rental value of $500 per m2 has been adopted for the conventional building in this study. A 10% rental premium is allocated for the ESD building to reflect the improved internal environment.

An allowance is also made for improved productivity. Referring to the CH_2 building in Melbourne, optimistic salary savings of $1.12 million pa are estimated and this amounts to $120 per m2 pa. The conservative savings of $350,000 pa amount to approximately $35 per m2 pa.

The outgoings (not including occupiers' utilities) for the CH_2 building have been reduced from $80 per m2 (current for a conventional building) to $65 per m2 in line with the energy and water savings discussed above. There are further reductions in the occupiers' utilities, but these are not included.

The net operating income is capitalized at 8% for the conventional building. An indicative allowance for psychic income is made by firming the capitalization rate to 7.5% to 7.75%. It is assumed that both buildings are fully precommitted.

Costs

The building costs are estimated at $29.9 million for the conventional building and $51 million for the ESD building to allow for the additional costs of ESD features as outlined above. The same development period is used for both buildings.

An interest rate of 8% is adopted for both buildings. Developer's profit is included at 10%.

Results

The residual studies are illustrated in Table 6. As can be seen, the land value for the conventional building is $8.75 million and that for the ESD building is $0.3 million (conservative savings) and $9.2 million (optimistic savings). This hypothetical study indicates that the worth of the ESD building ($63 to 75 million) is substantially greater than its estimate of price ($49 million) as suggested by the conventional building.

It should be noted that these are indicative studies only. In time, when ESD buildings are acceptable to the market in general, their advantages will be recognized in the additional rent paid by tenants. However, the approach outlined above is suitable for consideration by owner-occupiers.

DEVELOPMENT RETURNS			CONVENTIONAL BUILDING			CH_2 CONSERVATIVE			CH_2 OPTIMISTIC		
		Floor area	Rent/sqm	Net Rental		Rent/sqm	Net Rental		Rent/sqm	Net Rental	
Gross rental value			$500			$550			$550		
Staff savings			$0			$35			$120		
			$500			$585			$670		
Outgoings			$80			$65			$65		
Net rental value		9,373	$420	$3,936,660		$520	$4,873,960		$605	$5,670,665	
Net Income					$3,936,660			$4,873,960			$5,670,665
Capitalisation Rate					8.00%			7.75%			7.5%
					$49,208,250			$62,889,806			$75,608,867
Less sales commissions and costs			1.50%		$738,124	1.50%		$943,347	1.5%		$1,134,133
					$48,470,126			$61,946,459			$74,474,734
Less letting commissions and costs			15.00%		$590,499	15.00%		$731,094	15.00%		$850,600
NET RETURNS					$47,879,627			$61,215,365			$73,624,134
DEVELOPMENT COSTS											
Developer's Allowance for Profit and Risk				10.00%	$4,352,693		10.00%	$5,565,033		10.00%	$6,693,103
					$43,526,934			$55,650,332			$66,931,031
Building costs				$29,900,000			$51,045,000			$51,045,000	
Consultants' Fees			0.00%	$0		0.00%	$0		0.00%	$0	
				$29,900,00			$51,045,000			$51,045,000	
Construction Finance	Interest		8.00%			8.00%			8.00%		
	Construction period		24	$2,392,000		24	$4,083,600		24	$4,083,600	
Total construction costs					$32,292,O00			$55,128,600			$55,128,600
GROSS RESIDUAL LAND VALUE					$11,234,934			$521,732			$11,802,431
Less rates and taxes					$100,000			$100,000			$100,000
					$11,134,934			$421,732			$11,702,431
Less holding costs	interest		8.00%			8.00%			8.00%		
	preconstruction period		6		$1,855,822	6		$70,289	6		$1,950,405
					$9,279,112			$351,443			$9,752,026
Less land purchase expenses			6.00%		$525,233	6.00%		$19,893	6.00%		$552,001
NET RESIDUAL LAND VALUE					$8,753,879			$331,550			$9,200,024

Table 6: Residual Studies

CONCLUSION

The intention of this paper has been to examine the business case for sustainable design within the context of the City of Melbourne's new CH_2 building. The paper has identified the more common business case decision making tools and also presented the general case for ESD buildings which is based upon reduced energy usage (and in turn greenhouse gas emissions) together with increased production productivity, and an acknowledgement of the occupants within a building by providing a healthy environment as a form of social responsibility. Thus a "triple bottom line" model for business case decision making is appropriate for ESD buildings – one that considers and evaluates the financial, environmental and social aspects of a proposed development.

There can be no doubt that CH_2 has undertaken this process. With respect to financial drivers, the project has incurred a significant cost premium of 22% for the sustainability features. However, these features achieve substantial savings through energy and water savings, together with well-being and improvement for the occupants which includes reduced absenteeism, reduced churn, reduced stress and increased productivity. The optimistic scenario of anticipated savings is expected to payback the upfront investment cost after approximately 8-11 years, and the IRR over 50 year time horizon is 15.17% , well above the stipulated criteria of the risk free bond rate x 150%. Importantly, no allowance for future increases in costs (over and above the assumed inflation rate) of energy, water or employment has been factored into the calculations. Of the estimated savings, the improved effectiveness and well-being of staff represents the greatest saving, and within that category improved productivity is the major driver. Indeed, the 22% investment in sustainability features would not be feasible without this component, as the energy and water savings alone produce an IRR of only 4% over 50 years.

The CH_2 building has provided a strong link between building design, particularly indoor air environments, and production productivity, and in turn this has formed a substantial component of the business case for the development. It will be essential to undertake a post-occupancy analysis of this component to validate the business case and provide further tangible evidence of this aspect of ESD for future developments.

The environmental component of the business case represents more than just energy saving which can be measured in monetary terms (and indeed has been included in the financial component). It is also concerned with committing to being environmentally responsible for the sake of future generations. The CoM has developed a number of environmental criteria (energy level rating, energy reduction targets and use of renewable energy) and the CH_2 design conforms to these.

Finally, CH_2 provides a leading example of the social drivers component of a business case for a proposed development. The CH_2 development has specifically considered the needs and interests of the Council, council staff, ratepayers, central business district business and the wider community in its development. As such it provides a leading example of the business case for sustainable design for future development projects.

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