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The Cost of Going Green

SUSTAINABILITY ISSUES ARE RAPIDLY RISING ON THE CORPORATE AGENDA. RECENTLY COMPLETED RESEARCH BY CONSTRUCTION COST CONSULTANT DAVIS LANGDON ASSESSES THE COST IMPACT AND BENEFITS OF SUSTAINABLE MEASURES AND OUTLINES THE DECISION-MAKING PROCESSES INVOLVED IN GREENING OUR OFFICE BUILDINGS.

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Much has been written about the virtues of Environmentally Sustainable Development (ESD). Davis Langdon has studied the financial implications of ESD in order to assist owners, investors and designers in the development of meaningful business cases. The objective of our research was to improve the link between ESD principles and financial outcomes.

"Environmentally sensitive design solutions are not beyond the budgetary expectations of most building owners and investors"

A common misconception is that the implementation of ESD within a project requires radical design concepts with the introduction of cutting edge, and untested technologies and practices.

Our research shows that the majority of viable ESD options involve the implementation of common sense, practical, energy-efficient, short and long term cost effective solutions.

In our opinion, environmentally sensitive design solutions are not beyond the budgetary expectations of most building owners and investors. For as little as 2-4% additional capital cost, significant environmental measures can be incorporated, leading to long term recurrent cost reductions, potential increased asset valuation and a more attractive home for prospective tenants.

Community expectations for more environmentally friendly processes and buildings will almost certainly grow stronger in the future. When Australia ultimately agrees to sign the Kyoto Protocol or a later agreement, we can expect the trend to be reinforced.

The adoption of sound ESD designs has the potential to enhance the future-proofing of a building and to deliver some of the following benefits:

- **Enhanced leasing potential associated with high Green Star rated buildings**
- **Increased capital value of building**
- **Reduced operating and total recurrent costs**
- **Enhanced payback on some options if energy and water costs rise faster than predicted in initial studies (as many predict)**
- **Reduced risk of obsolescence if building initially includes relevant ESD designs and flexibility**
- **Enhanced resale potential and price**
- **Reduced costs for future upgrades**
- **Potential for enhanced staff productivity**

The dilemma faced by developers is finding the right group of ESD options that are financially attractive; and providing operating cost advantages and benefits to tenants.

Potential Industry Role

There is a major role for the Property Council of Australia in the implementation of ESD. The PCA can upgrade the Classification of Office Space to reflect current best practices for Premium and Grade A buildings. More basic ESD options could be included in the Grade B, C and D office building classifications. The grading of other classes of buildings and associated ESD levels could follow.

Rating of ESD Options

Over the years many methods have been suggested for rating a combination of ESD proposals. It now seems likely that the Green Star system proposed by the Green Building Council of Australia will be widely adopted in Australia. Accordingly, Davis Langdon's research identifies key options in the classifications recommended in the Green Star tool.

It is important that building owners, investors and designers are aware that while Green Star formally certifies only the market leaders (Four stars and above), it deliberately maintains the full range of One to Six star ratings so that designs, projects or buildings that do not qualify for formal certification can use the rating tool as a guide to track and improve their environmental performance.

Davis Langdon is also an active member of the technical working group that is helping to develop Green Star tools for application on interiors and for existing offices.

Financial Issues

Many of the ESD options identified involve extra initial capital expenditure, but achieve reduced short to long-term operating cost benefits. A number of these options and potential pay back periods are identified in our findings.

We have also developed a process for considering these options individually and collectively.

Some decision makers have shown a tendency to integrate financially unviable, but visually recognisable aspects of ESD into their designs, as a public demonstration of sustainability. This still pushes the green message, but the measurable pay back benefits may be slim.

Normal Best Practice

Providers of Premium and Grade A office space have generally responded to market trends with the following ESD attributes (listed under Green Star categories), now being included within base building designs as normal practice:

Management Category

> Comprehensive Commissioning

> Building Users Guide to include energy management provisions

Indoor Environment Quality Category

> Reduction of Indoor Air Pollutants

> Noise Control to AS/NZS2107

Energy Category

> Reduced Greenhouse Emissions

> Building Orientation

> Appropriate Primary Energy Source

> Energy Improvements/Targets

> Peak Energy Demand Limiting

> Electrical Sub/Tenancy Metering

> Energy Efficient Glazing

> Energy Effective Internal Sun Shades

> Appropriate Internal Zoning of Air Conditioning

> VAV (or more efficient) Air Conditioning

> Economy Outside Air Cooling Cycles

> Variable Speed Drives

> Carbon Monoxide Controlled Car Park Ventilation Systems

> Zoning and Out of Hours Controls to Cut Energy Costs for after hours operation of AC

> Building Management Systems (BMS) with Energy Saving Features

> Power Factor Optimizing

> Adequate Zoning of Lighting

> High Efficiency Lighting (T5)

Transport Category

> Proximity to Public Transport

Water Category

> Selection of Equipment & Appliances to minimise the wasteful use of Water

Materials Category

> Consideration of Refurbishment in lieu of New Build

> Use of Plantation Timbers

> Recycling of Waste Materials

Land Use & Ecology Category

> Reuse of Previously Developed Land

Emissions Category

> Low Ozone Depleting Refrigerants

> Low Global Warming Potential Refrigerants

> Adequate Control of Refrigerant Leakage

Potential Short/Medium Term Payback ESD Options

The ESD Attributes Cost Study on the following page lists Indicative Green Star Credits, Capital Cost and Pay Back for a selection of potentially viable ESD options.

Commonly Considered & Potential Short/Medium Term Payback ESD Options

SAMPLE LIST OF POTENTIAL ATTRIBUTES	Potential Operating Cost Improvement	Potential for Productivity Improvement	Symbolic ESD Impact	Potential Green Star Credits	Capital Cost $/m² Range		Typical Payback Range (Years)		Advantage Where No Financial Payback
Management Category									
Independent Commissioning Agent	✓	✓		1	1	2	0	3	RR
Environmental Management Plan	✓	✓		3	0	2	nil	nil	MEI
Indoor Environment Quality Category									
Central Atria – Increasing natural light penetration	✓	✓	✓	2	19	48	PS	PS	
Increased Daylight Penetration (through effective glazing design and sunshelves)	✓	✓	✓	3	4	14	PS	PS	
External Shading devices to North Façade (On low rise buildings)	✓	✓	✓	1	4	12	10	15	
Displacement Ventilation	✓	✓		2	10	40+	5	15+	
Low Volatile Organic Compound containing paints		✓		1	0	5	nil	nil	IIAQ
Low Volatile Organic Compound containing carpet (wool or specific solution dyed products)		✓		1	0	10	nil	nil	IIAQ
Energy Category									
Optimise Glazing Type	✓	✓		C	16	24	10	18	
Increased Wall, Floor and Roof Insulation Rating	✓			C	2	6	5	10+	
Chilled Beams	✓		✓	C	50	75+	5	8+	
High Efficiency Electric Motors	✓			C	1	2	5	10	
Super Pipework and Ductwork Insulation	✓			C	3	7	5	10	
Night Purging through use of BAS Controls	✓			C	0	1	0	10	IIAQ
Occupancy Sensors (selected areas) / Lighting Zoning	✓			1	2	4	4	8	
Lighting Control System (selected areas)	✓			C	2	4	4	10	
Photovoltaic Cells	✓		✓✓	C	8	14+	10	25+	
Transport Category									
Provision of Bicycle Storage and Change Facilities for ease of use by employees		✓	✓	3	2	6	nil	nil	RE
Water Category									
Greywater Collection, Treatment, Storage and Use	✓		✓	5	15	30	12	25+	
Materials Category									
Concrete with Recycled Content (Green Concrete)				3	3	6	nil	nil	MW
PVC Reduction				2	1	3	nil	nil	MEI
Land Use & Ecology Category									
Minimise ecological impact & maximise enhancement of site for new and existing buildings			✓	4	PS	PS	nil	nil	MEI
Emissions Category									
Minimise neighbourhood light pollution				1	0	1	nil	nil	MEI

NOTES ON TABLE:

1 The figures stated are taken from various projects, both in sizes and locations. They represent an average cost for the attributes stated, taking into account all associated works required.

2 The costs and payback periods are provided as a guide only. Any business case must be reviewed on its own merits.

3 The figures have been compiled from a number of projects to provide a general overview of the likely ESD opportunities available to clients considering new developments.

4 It should be noted that the operating cost saving has been calculated on an individual basis, and that the cumulative effect of incorporating ESD attributed may be less than the sum of the individual parts calculated.

5 The Green Star credits are provided as an indication only and would be assessed by an accredited Green Star Assessor on a project-by-project basis.

6 The items are those which have been considered repeatedly in the early design stages of projects.

7 The table examines each of these attributes in terms of potential operating cost improvements, potential productivity gains, impact on symbolic ESD, and the indicative Green Star Credit available. Anticipated Capex ($/m²) and typical payback periods (years) are also provided for each item.

8 It is noted that some ESD initiatives naturally fit together and frequently support the case for other attributes.

LEGEND:
RR = Reduced Risk **IIAQ** = Improved Indoor Air Quality **MW** = Minimises Waste **RE** = Reduced Emissions **MEI** = Minimises Environmental Impact
PS = Project Specific **C** = Contributes to Energy Improvement/Greenhouse Reduction with potential of 15 Credits

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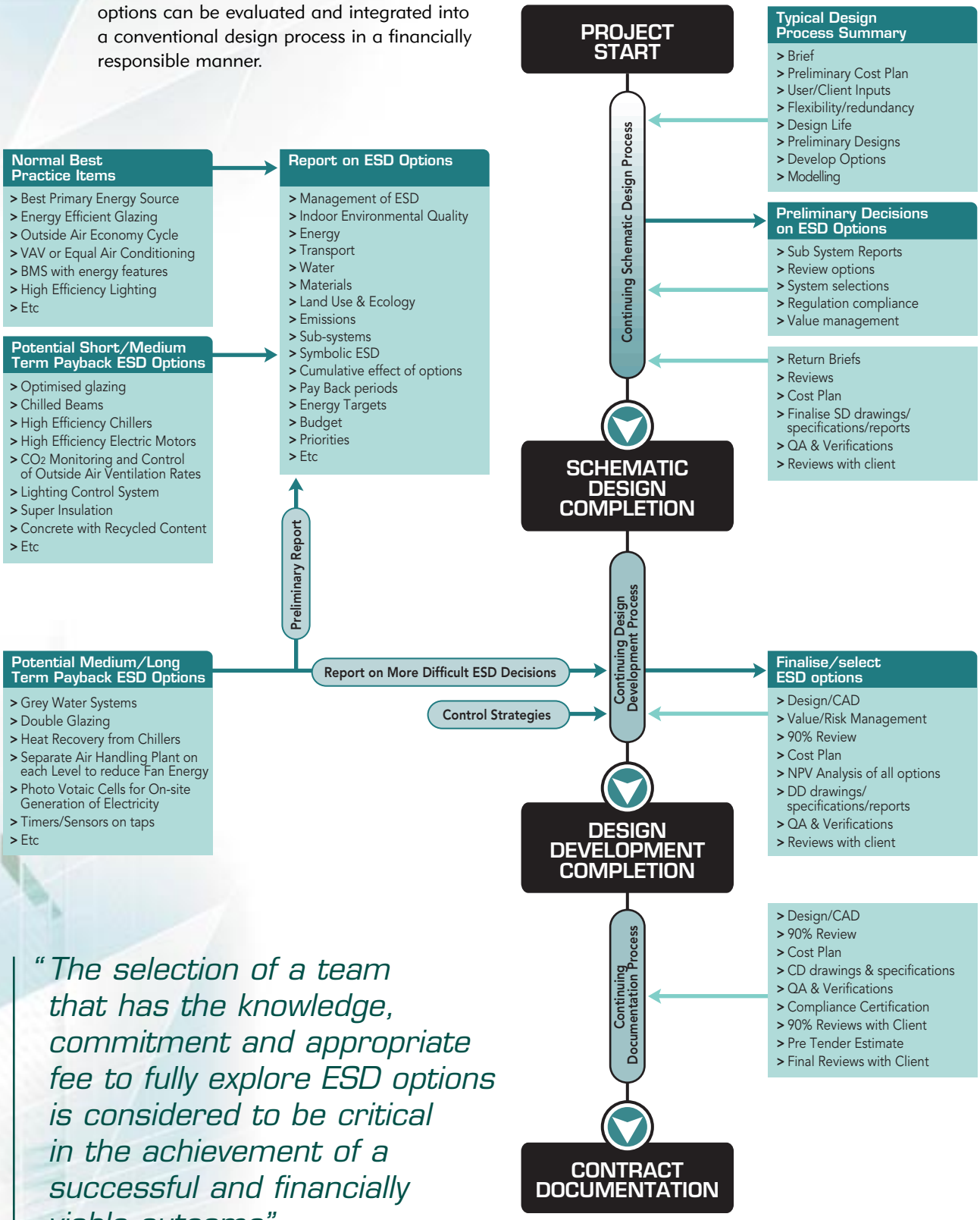
Integrated ESD Design

The following diagram illustrates how ESD options can be evaluated and integrated into a conventional design process in a financially responsible manner.



"The selection of a team that has the knowledge, commitment and appropriate fee to fully explore ESD options is considered to be critical in the achievement of a successful and financially viable outcome" – Lee Williams

Potential Medium/ Long Term Payback ESD Options

The following are examples of initiatives that would normally be classified in the Potential Medium to Long Term Payback Category.

Management Category

>Environmental Management Plan

Indoor Environment Quality Category

>Natural Ventilation in selected areas

>External Sun Shading

>Double Glazing

>Double Skin Facades

>Optimized Daylighting

Energy Category

>Heat Recovery from Chillers

>Separate Air Handling Plant on each Level to reduce Energy

>Solar Hot Water Systems

>Photo Voltaic Cells for On-site Generation of Electricity

>On Site Power Generation and Heat Recovery

>Chilled Water/Ice Storage

>Passive Cooling Strategies

Transport Category

>Encouraging the use of smaller more Fuel Efficient Vehicles

Water Category

>Rain Water Collection & Use

>Reduced Water requirement for Toilet Flushing

>Condensate reuse

>Grey Water Systems

>Black Water Systems

>Timers/Sensors on Taps

Materials Category

>Optimizing of Building Grids to Minimise Wastage

Land Use & Ecology Category

>Reclaim Contaminated Land

Emissions Category

>Use of Materials (eg: Insulation) with Reduced Ozone Depleting Emissions during Manufacture

Productivity Gains

The big sleeper in the viability of additional ESD features is the establishment of links between green solutions, improved staff comfort levels, higher staff satisfaction levels and increased staff productivity.

Research work is continuing in this area, with the possibility of a link being scientifically established within the early life of new buildings.

If, as anticipated by many, the outcome of studies confirms significant productivity gains associated with the inclusion of appropriate ESD options, the viability of green solutions will be significantly enhanced.

Flexibility to Enable Future ESD Implementation

The economics of ESD options will change with time due to technical developments, changing economic conditions, higher water costs and higher energy costs.

Overall, the trend is expected to be tilted further in favour of lower energy and operating cost solutions.

The incorporation of flexibility in designs to enable the implementation of future ESD initiatives could have an important impact on the viability of some future options.

Building Interior

Building-in of flexibility of interior fitouts is also an important issue to enable wastage and costs associated with churn to be minimised.

Design Team Selection

The selection of a team that has the knowledge, commitment and appropriate fee to fully explore ESD options is considered to be critical in the achievement of a successful and financially viable outcome.

Energy Targets

An important element in ESD designs is the establishment of energy targets for the building.

Studies have consistently shown that the long term operational costs of commercial buildings far outweigh the cost of construction. Energy savings are the single largest quantifiable benefit for the implementation of ESD. As a result, savings in energy consumption can have a dramatic effect on the annual energy cost of a building. Of primary importance is the inclusion of metering that allows the regular monitoring of performance against these energy targets.

"Those who make the effort to deliver Green Buildings will enjoy inherent long term advantages, at low capital cost premiums"

Commissioning and Monitoring

Much effort is put into the selection and design of ESD friendly systems. It is considered to be of paramount importance that these systems be properly commissioned, independently checked and monitored over the life of the building.

INDEPENDENCE + UNDERSTANDING + INNOVATION =

YOUR PROJECT AND PROPERTY COMPETITIVE ADVANTAGE

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