



Sustainability and Facility Management
9 August 2005 Forum
Potts Point

LCADesign - Industry Perspective

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Context

Environmental impact of buildings is ***substantial*** but our ***understanding*** of efficient measures to abate impacts is ***small***.

Ecological efficiency of built products must ***radically improve*** to reduce the risk of effects such as, climate change.

Issue

Regulation and investor interest in responsible allocation of funds is driving industry need for cost effective impact assessment tools.

Paradox is that current methods are too complex for average person and too expensive relative to what they deliver.

Barriers

1. Lack of appreciation for the priority of environmental impacts.
2. No current business case for embodied water and emissions.
3. Translation of complex LCA science to the language of design team.
4. Cost of manual assessment.

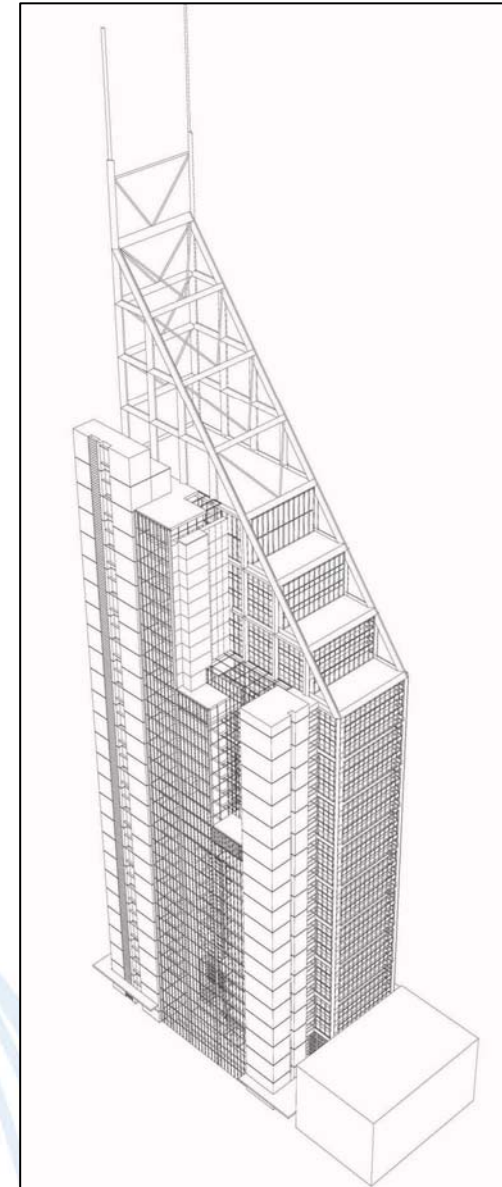
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Project LCA can cost \$3 to \$5 / m2 NLA for office and take many months.

Too much, too long, too late.

Design can't react to impact assessment results.

ASPECT	WEIGHTING	MBS AVERAGE WEIGHTED SCORE	WEIGHTED SCORE
OPERATIONS MANAGEMENT	18%	7.29	1.31
RESOURCE CONSUMPTION	18%	8.03	1.45
ENVIRONMENTAL LOADINGS	15%	8.45	1.27
INDOOR ENVIRONMENT QUALITY	18%	7.71	1.39
ECONOMICS	21%	6.80	1.43
EXTERNAL BUILT ENVIRONMENT	10%	6.09	0.61



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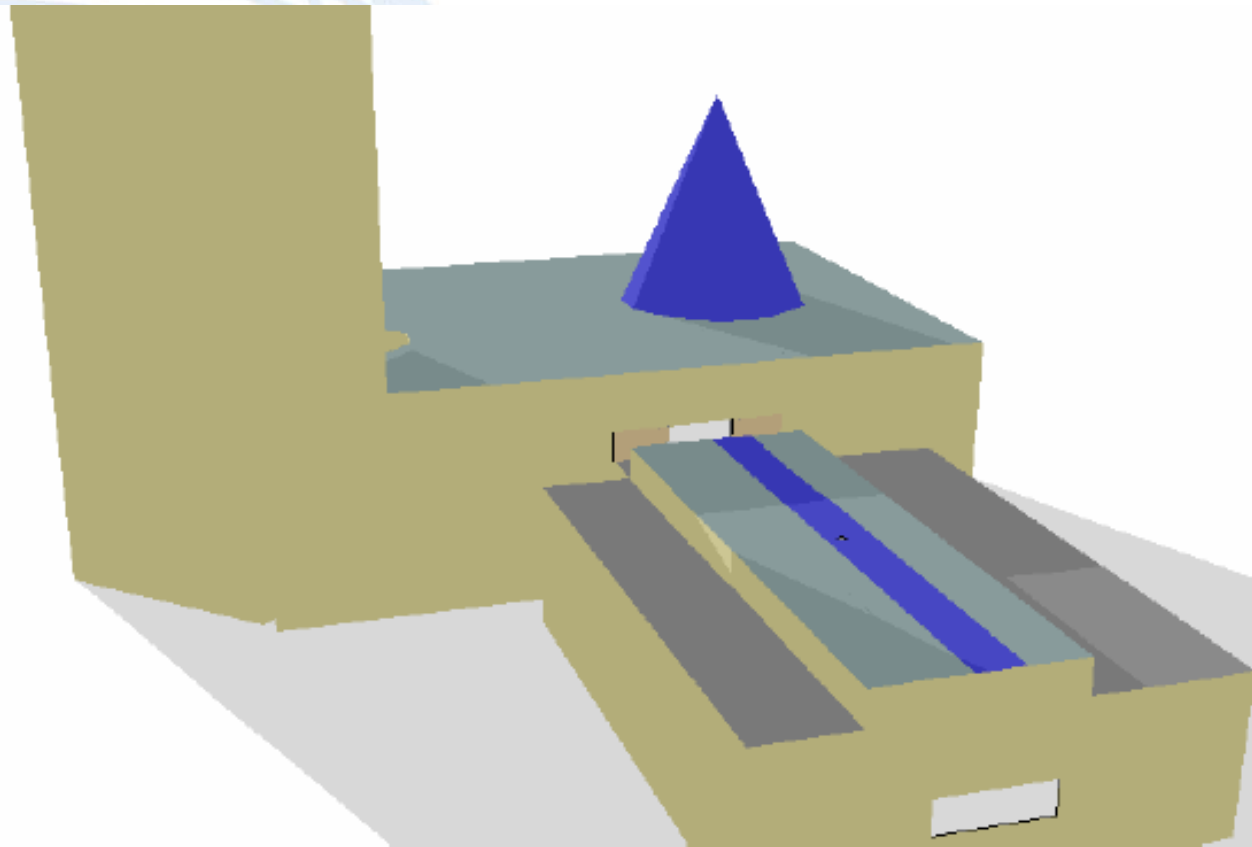
CRC Response - LCADesign

An automated real-time environmental impact assessment tool in a 3D CAD platform.

3D CAD as a design platform has expanded rapidly due to its productivity benefits and client focussed, friendly outputs.

3D Application for Environment

Use for thermal modelling now well established.



Melbourne Central Thermal Model



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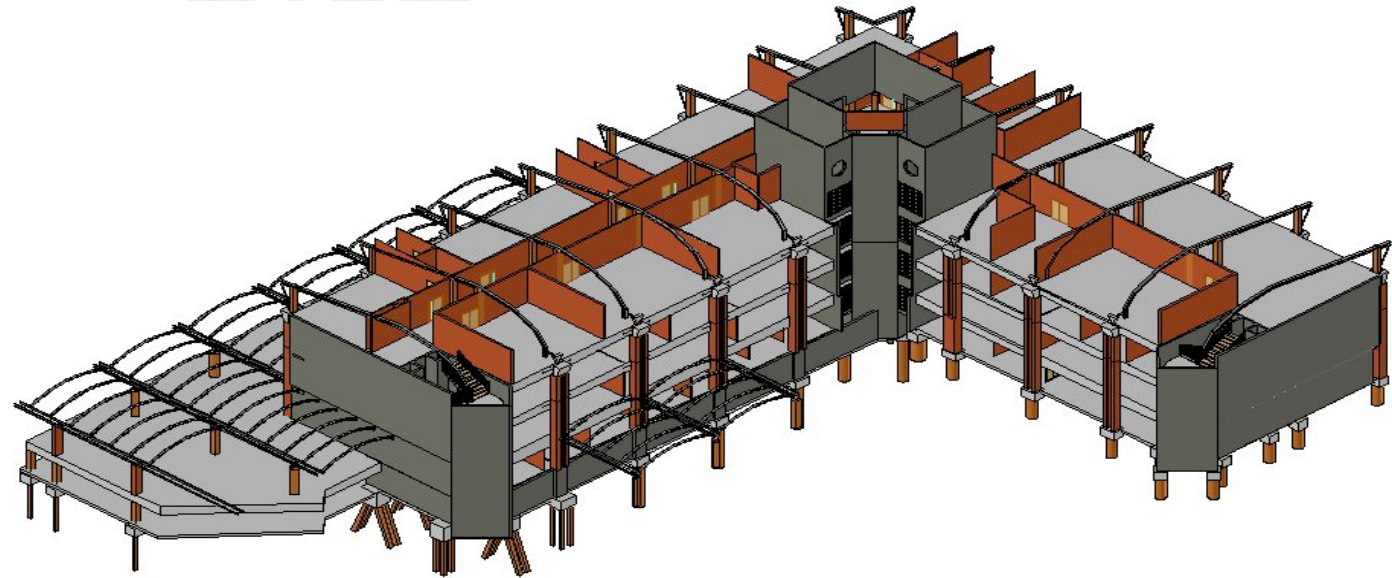
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Assessment Process

1. Designer develops the 3D CAD model.
2. Automated quantity take-off completed.
3. LCI refers to the schedule of quantities.
4. Relevant indicators selected by user.
5. Results generated.
6. Comparative analysis of alternative designs enabled.

Assessment Process

1. Designers generate the 3D CAD model as normal part of design process.



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Assessment Process

2. Automatic take-off from CAD to produce a schedule of quantities.

IFC based Quantity Takeoff System Copyright (c) 2002 CSIRO

File name: southbank_tafe.ifc
 Description: ArchiCAD generated IFC file.
 Author: Architect
 Organization: Building Designer Office
 Time stamp: 2002-04-30T15:19:07
 Schema: IFC R2.0

Walls Columns
 Doors and windows HVAC
 Spaces

Wall type	Int_ext	Component type	Thickness	Thickness unit	Height	Height unit	Length	Length unit	Total area	Total a±
* Concrete	?		?	m	?	m	?	m	?	m2
* Concrete	?		0.20	m	3.00	m	45.55	m	136.65	m2
* Concrete	?		0.20	m	3.00	m	75.03	m	225.08	m2
* Concrete	?		0.12	m	3.00	m	4.62	m	13.85	m2
* Concrete	?		0.20	m	3.00	m	59.58	m	178.73	m2
* Concrete	?		0.23	m	3.00	m	8.97	m	26.90	m2
+ Concrete	?		0.20	m	?	m	17.01	m	25.51	m2
+		Wall segment			?	m	17.01	m	25.51	m2
* Concrete	?		0.20	m	3.69	m	138.77	m	511.35	m2
* Concrete	?		?	m	?	m	?	m	?	m2
* Concrete	?		0.20	m	3.69	m	52.71	m	194.23	m2
+ Concrete	?		0.11	m	3.69	m	7.05	m	25.97	m2
+		Wall segment			3.69	m	7.05	m	25.97	m2
+ Brickwor	?		0.11	m	3.69	m	1.98	m	7.31	m2
+		Wall segment			3.69	m	0.71	m	2.63	m2
+		Wall segment			3.69	m	1.27	m	4.68	m2
+ Concrete	?		0.23	m	3.69	m	10.00	m	36.85	m2
+		Wall segment			3.69	m	10.00	m	36.85	m2
+ Concrete	?		0.20	m	3.69	m	19.15	m	70.58	m2
+		Wall segment			3.69	m	0.36	m	1.31	m2
+		Wall segment			3.69	m	2.76	m	10.19	m2

Walls | Windows and doors | Spaces | Columns | HVAC

Assessment Process

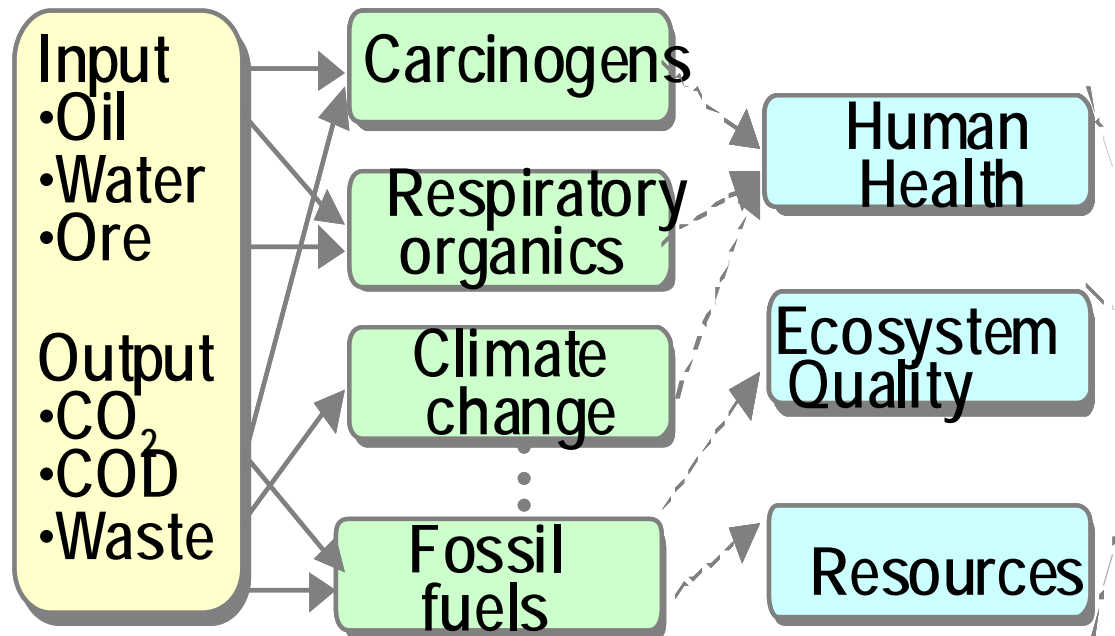
3. LCI database refers to schedule of quantities and calculates impacts.

9015 Dry Cement Clinker Formation			
	Input operation	Quantit	Unit
1	Air emission dust processing	7500 0000	mg
2	Air emission CO processing	370000 000	mg
3	Air emission CO ₂ processing	500000 000	mg
4	Air emission SOx processing	8000 0000	mg
612	Solid Waste Mineral Waste	0.0707	kg
818	Burn coal feed stock as fuel	0.2646	kg
842	Coal use in Australia	1.6262	MJ
878	Diesel Use in Australia	0.3900	MJ
884	Other Oil Use in Australia	0.1870	MJ
888	Natural gas use in Australia	1.5000	MJ
3542	Road Transport A 18+ tonne	0.0019	Vkm
3544	Rail Transport Freight	0.4800	vVkm
9014	Mix ture for Cement Making	1.4400	kg



Assessment Process

4. Impact indicator selected by user for specific assessment.



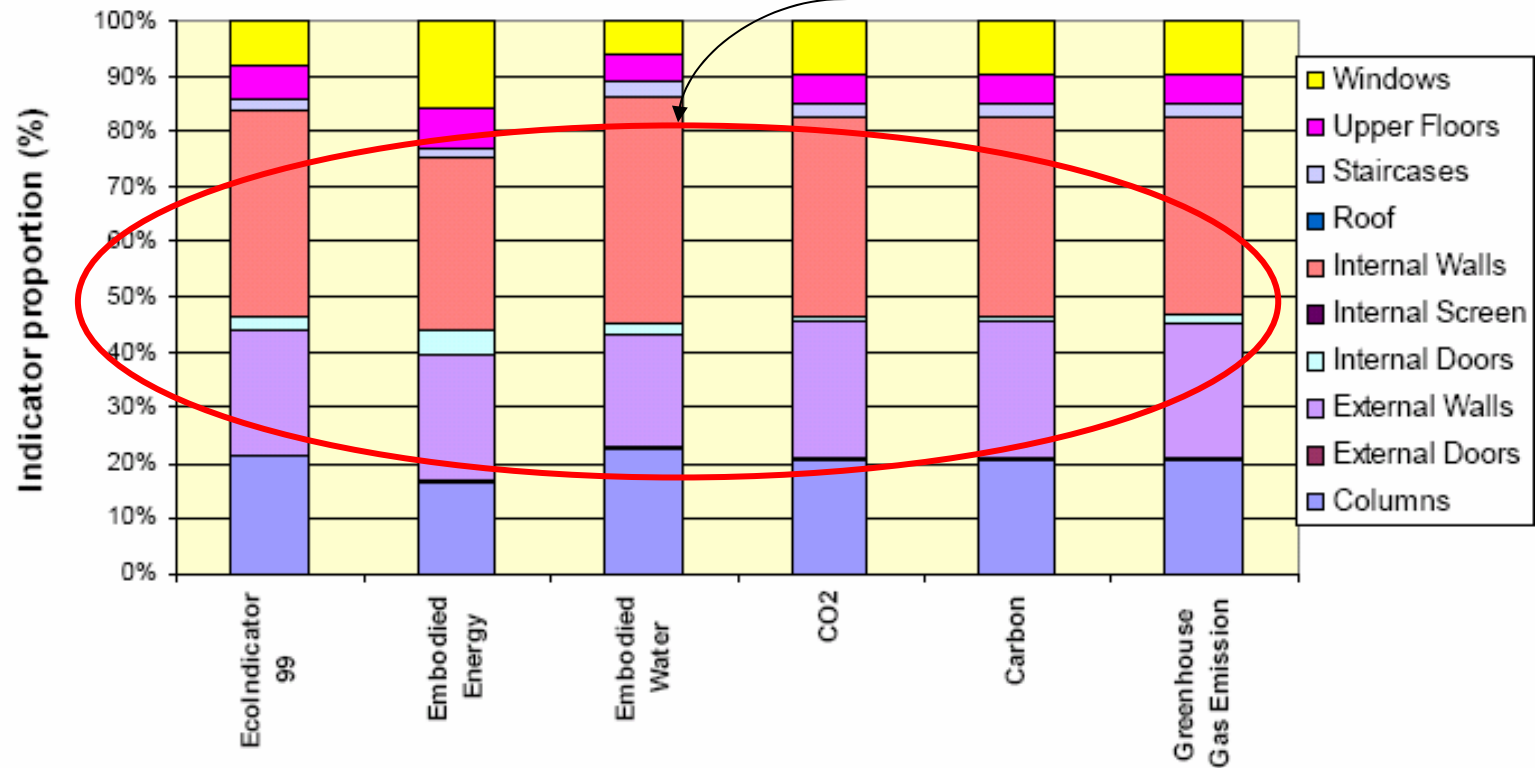
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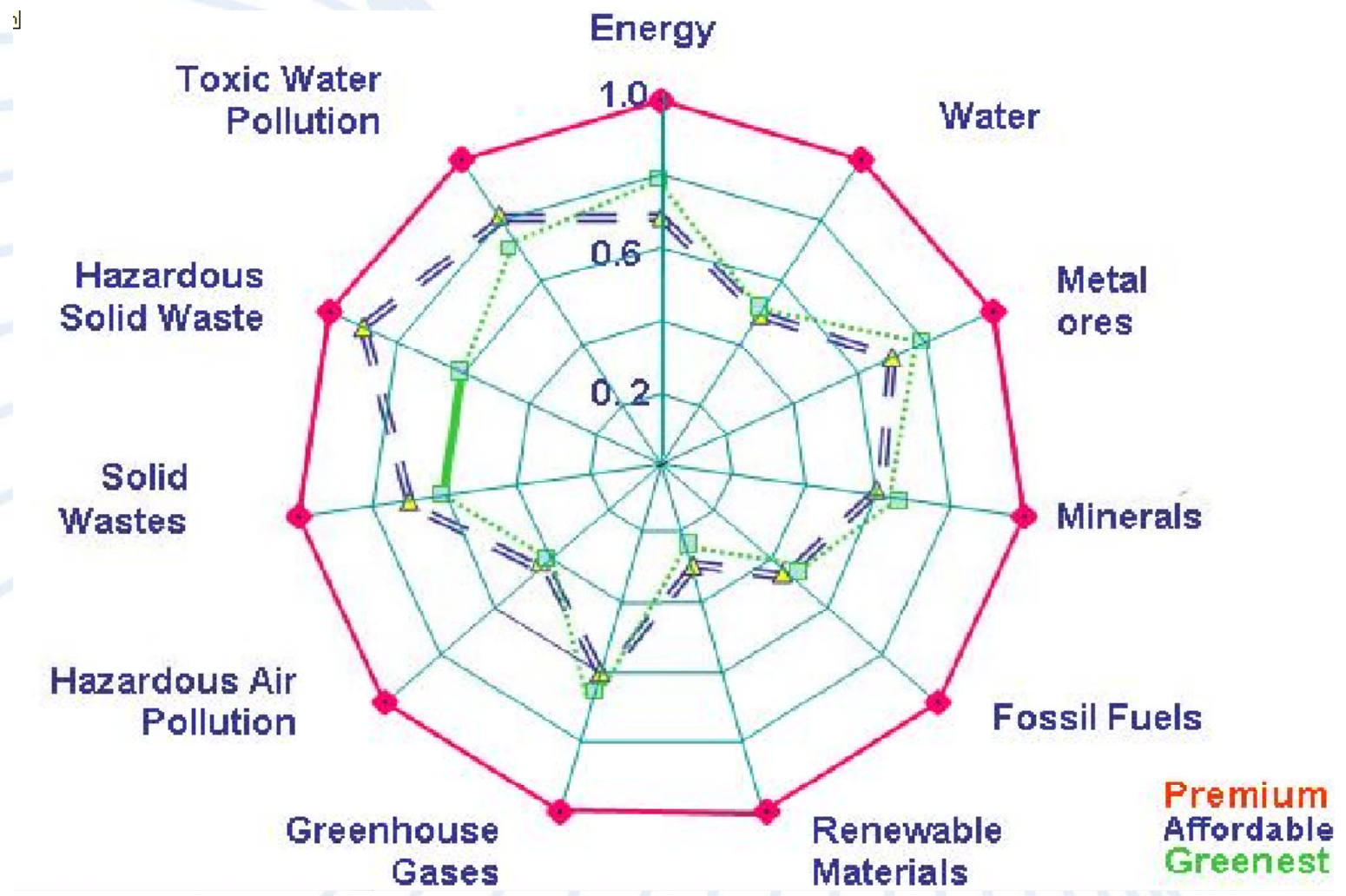
Assessment Process

5. Analysis of results either whole building or by element.

Focus point in this design on internal and external walls as biggest driver of all impacts across all categories.



Comparative Analysis of Design Solutions



LCADesign for Property

Embracing Opportunity:

Services the needs of those seeking environmentally preferable buildings – where results are defensible.

Managing Risks:

Increases understanding of how to build with lower emissions footprint and reduce inflation risk of greenhouse.

LCADesign for Property

Cost Competitive:

Reduces the cost of environmental assessment.

Value Creation:

New service platform for environmental and design professionals.



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Limitations

1. Uncertainty of LCI database data.
2. Maintenance of databases in a rapid product market.
3. Completeness of object databases.
4. User education and capacity.
5. Commercial results.

Conclusion

1. Powerful tool with potential to transform environmental assessment market.
2. More work to evolve reliability of some aspects.
3. Application needs to feedback into continuous development loop.
4. Issues are here to stay, LCADesign a innovative response.