A Study on the Economic Analysis Method of Building Energy Considering Environmental Costs and Life Cycle

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Abstract

This study presents a method of economic analysis of building energy saving measures. The basic principle and method of economic analyses were investigated and total life cycle cost considering environmental costs according to energy consumption and CO_2 generation at each life cycle phase of a building was analyzed. The economic efficiency of applicable building energy saving measures was analyzed through the computer simulation of energy saving alternatives and the examination of total life cycle cost considering environmental costs.

If the life of a sample apartment building (ALT 2) is 20 years and the discounted rate and the increasing rate of oil price is respectively 4.13% and 5.8%, a sample energy saving measure that the internal rate of return comes to be 0 can have economic benefit from 9 years after construction. In the analysis of total life cycle cost considering environmental costs, it is indicated that the environmental cost depends on running phase. Therefore, it is required to apply energy conservation building system to reduce the environmental costs. As a result of the sensitivity analysis of Benefit/Cost (B/C) Ratio of the sample energy saving measure, the most influential factors were additional construction cost and saved energy cost, and the additional construction cost and discount ratio had negative effect.

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Keywords : Economic Analysis, Energy Conservation, Life Cycle Cost, Environmental Costs

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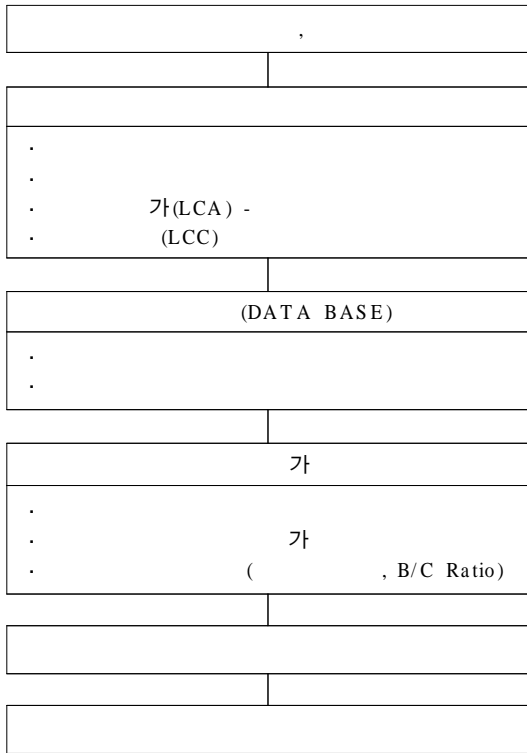
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$(/TOE) \times$ $(/)$3)

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VISUAL- DOE

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12mm   50mm
1   ALT 1, ALT 2, ALT 3
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2) Ibid., pp.107 108
3)   , 1999(CO 1
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1)   , "   ",   , 1993, pp.11 12

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ALT 3		,

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[4] Thomas Björund, Åsa jönsson and Anne-Marie Tillman, "LCA of Building Frame Structures", CHALMERS UNIVERSITY OF TECHNOLOGY, 1996, pp. 60-62

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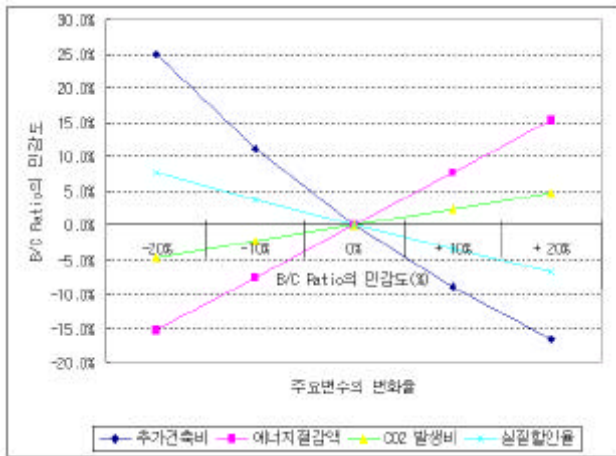|			(20)		
ALT 1	4,603	998,903	10,543,610	3,895	11,551,012
ALT 2	14,209	2,989,424	9,380,851	12,198	12,396,682
ALT 3	16,026	2,728,345	10,925,350	9,637	13,679,359

ALT 2

, CO_2 53.3%, 46.7%

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CO_2 82.3%, 17.7% .

3)

NPV, IRR, B/C Ratio, LCEC .

20

4.13%, 10

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		( )	LCC+
ALT 1	4.57	5,17	3.85
ALT 2	9.39	12.15	8.71
ALT 3	14.73	23.28	15.54

2

4) [5]

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, CO_2 B/C
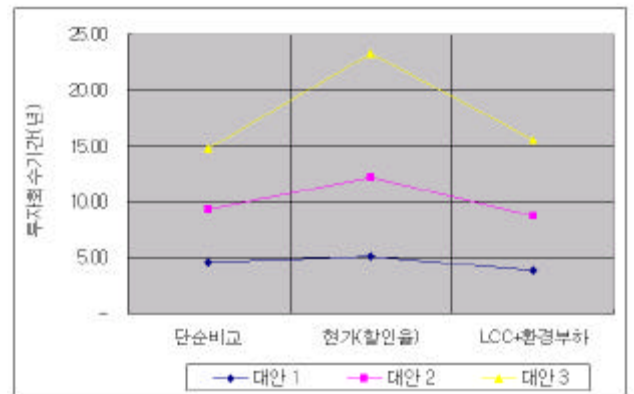
Ratio .

-20% +20%

B/C Ratio (%) .

ALT 2

, 5 3 .

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[5] 6 , " ", , 1998, pp. 47 50

	B/C Ratio		(%)		
	-20%	-10%	0%	+10%	+20%
	25.0%	11.1%	0.0%	-9.1%	-16.7%
	-15.3%	-7.6%	0.0%	7.6%	15.3%
CO2	-4.7%	-2.4%	0.0%	2.3%	4.7%
	7.7%	3.8%	0.0%	-3.6%	-6.9%

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5) B/C Ratio

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3.   B/C Ratio

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-20%
+20%   B/C Ratio
(25.0%   -16.7%),   (-15.3%
15.3%),   (7.7%   -6.9%), CO₂   (-4.7%
4.7%)   ,
(-)   .

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4)   20   ,
4.13%,   ,

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