

A Study on the Economic Analysis of the Recycle of Demolished Concrete considering Environmental Cost

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.....
Abstract

It is estimated that 20 million tons of construction wastes have been produced every year in Korea and the amount of them will be increased according to the increase of reconstruction of large-scaled apartment towns. As the area to be landfilled is limited and reduced due to the increasing construction wastes, demolished concrete which composes most of construction wastes should be recycled to conserve the nature. In this respect, this study aims to present the economic gains through the environmental cost analysis of recycled aggregate production from demolished concrete. This research shows that the total cost considering the environmental cost in producing recycled and natural aggregate is respectively 1,192 and 9,527 Won/m³, and that the estimated amount of recycled aggregate in 2004 and 2010 will be 3,788,000 and 4,130,000 m³, accordingly 28.4 and 31.0 billion Won will be expected to be saved by using the recycled aggregate instead of natural aggregate.

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Keywords : Demolished concrete, Recycled aggregate, Recycling, Environmental cost
.....

1. 가 .
1997 12
131 m³ ,
가 30.5% 40 m³ .
2002 75%
가 500m³
가 .1) 1,000
가 , , .
가 가 10 1997 12 48.8%가
5 , 41.1%
10.1%가
가
50%

.....
* , , ,
** , , , 가
*** , , ,
1998 가
: 98-0602-01-01-3 가

1) , “ ”, 9 CO₂ ,
6 , 1997.12, p.9

2.

1990

.6)

1993

「資源節約再活用促進法律」

250

‘指定副産物’

EC 가

.2)

가

2000

50%

가

.3)

가

가

가

.4)

()

1994

6

()

.5)

()

1994 5

1991

1994 8

1993

, 가

가

.8)

2) Lauritzen, Erik K., "Demolition and Reuse of Concrete and Masonry", RILEM 3th International conference, Odense, 1993

3) Morel, A. and Gallias, J.L., "Development of demolition material recycling in France and Spain", Proceedings of International Recycling Congress REC 93, Geneva, 1993

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5) Wilson, Alex., "Cement and concrete: Environmental Considerations", Environmental Building News, 2(2), March/April 1993

6) Kasai, Y., "Guidelines and the present state of the reuse of demolished concrete in Japan", Narashino, 1993

7) , " , 1997

8) 外, " , 1995

(Pilot test)

			1994	1999
r				
2000	1	1		
55%		70%		

9)

1. (: %)

1998	1	1				
1999	12	31	60	50	35	-
2000	1	1				
2001	12	31	70	70	70	30
2002	1	1	75	75	75	50

3.

3.1

1997

4,425 m²

.10)

0.57m³

1.6 - 1.8t/m³
1997

$$4,425,000\text{m}^2 \times 0.57\text{m}^3/\text{m}^2 = 2,522,250\text{m}^3$$

$$2,522,250\text{m}^3 \times 1.7\text{t}/\text{m}^3 = 4,287,825\text{t}$$

, 1960 - 1970

20 - 30

가

1990

가

2,000

2 .11)

9) . , “ , 1999.7 ” ,

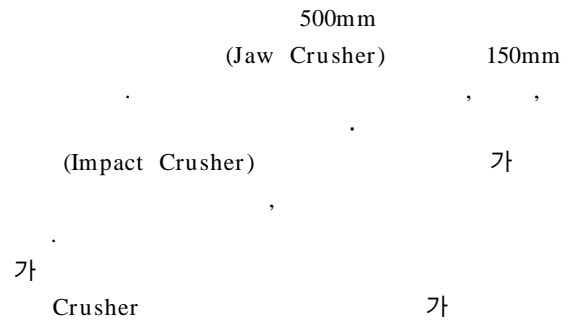
10) , “ , 1999.12., p.3 ” ,

11) “ (1) ” , 1997.2, p.77.

2.

	2000	2002	2004	2006	2008	2010
(m ³)	3,622	4,318	5,050	5,505	5,837	5,507
()	2,737	3,012	3,287	3,562	3,837	4,112

3.2



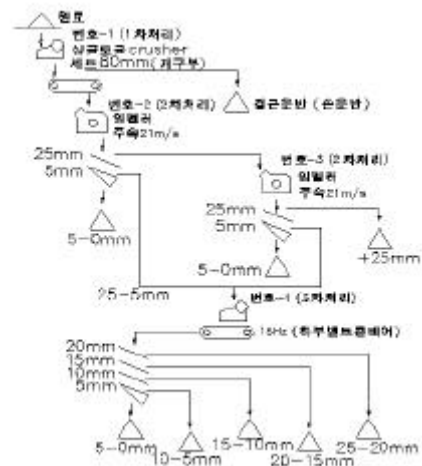
(100t/h)

1,2

(100t/h)
(磁選機)

3

가



1.

4.

4.1

가
 EC
 가
 (1)
 EC
 1990 1 EC()
 2000 1990
 91 9 EC 「CO₂」
 EC
 EC 가 「
 ()」
 EC가
 ()
 (excise tax)
 3 7 1
 10
 (2) 가
 가 (가)
 가
 가
 가

4.2

12)
 가
 가 CO₂ 가
 (,kg,Nm³) = (kcal/ ,kg,Nm³)
 ÷ 10⁷kcal× (/TOE)× 가 (/
)
 10⁷kcal
 TOE
 , TOE
 , kg,
 Nm³
 가 가

12) , “ ”,
 , 2000.5

가

4.3

3

가

CO₂

1)

3. ()¹⁾

	(L/m ³)	(/kwh, /L)	(/m ³)
	0.5	518.5 ¹⁾	259
	0.5	518.5	259
	0.5	518.5	259
1	1.4	518.5	726
	0.7	518.5	363
	(kwh/t) 2.87	48.87 ²⁾	140
2	1.4	518.5	726
			2,733

1) (518.5 /L) : 1999 가 , (48.78 / kwh :) : 가 1999 9

2) 574kwh/ 200ton

3) 1 2

, 1 , 2 ,

2,733 /m³

4. ()

	(L/m ³)	(/kwh, /L)	(/m ³)
	0.5	518.5 ¹⁾	259
	0.5	518.5	259
	0.7	518.5	363
	(kwh/t) 2.87	48.87 ²⁾	140
			1,022

1,022 /m³

2) CO₂

CO₂

CO₂

CO₂

5. () CO₂

	CO ₂ (kg/L) ¹⁾	CO ₂ (kg/m ³)	(/kg) ²⁾	(/m ³)
	2.824	1,412	27.6	39
	2.824	1,412	27.6	39
	2.824	1,412	27.6	39
1	2.824	3,954	27.6	109
	2.824	1,977	27.6	55
	(kwh/t) 0.4778	1.371	27.6	38
2	2.824	3,954	27.6	109
		15,492		428

1) CO₂ - 2.824 kg/L() : IPCC , CO₂ , 0.4778 (224,445 × 10⁶ kwh)

kg/kwh : 997

2) 1999 가 \$23 27,600

CO₂

15.492kg/m³, 428 /m³

6. () CO₂

		CO ₂ (L/ m ³)	CO ₂ (kg/L)	CO ₂ (kg/ m ³)	(/kg)	(/ m ³)
		0.5	2.824	1,412	27.6	39
		0.5	2.824	1,412	27.6	39
		0.7	2.824	1,977	27.6	55
	(kwh/t)	2.87	0.4778	1,371	27.6	38
				6,172		170

CO₂

6.172kg/ m³, 170 /m³

4.4

CO₂

1)

7. ()

		(L/ m ³)	(/kwh, /L)	(/ m ³)
		0.5	518.5	259
		0.5	518.5	259
		0.7	518.5	363
	(kwh/t)	2.87	48.87	140
		1.4	518.5	726
				1,748

)

가

1,748 /m³

2) CO₂

CO₂

8 10.126kg/ m³, 279 /m³

8. () CO₂

		CO ₂ (L/ m ³)	CO ₂ (kg/L)	CO ₂ (kg/ m ³)	(/kg)	(/ m ³)
		0.5	2.824	1,412	27.6	39
		0.5	2.824	1,412	27.6	39
		0.7	2.824	1,977	27.6	55
	(kwh/t)	2.87	0.4778	1,371	27.6	38
		1.4	2.824	3,954	27.6	109
				10,126		279

4.5

가

1)

2000

가

9

9.

		(kg/ m ³)	(%)	(%)	(/kg)	(/ m ³)
		1,000	70	50	0	0
		1,000	70	50	0	0
						7,500

1)

1m³ Iton

2)

가 (1999)

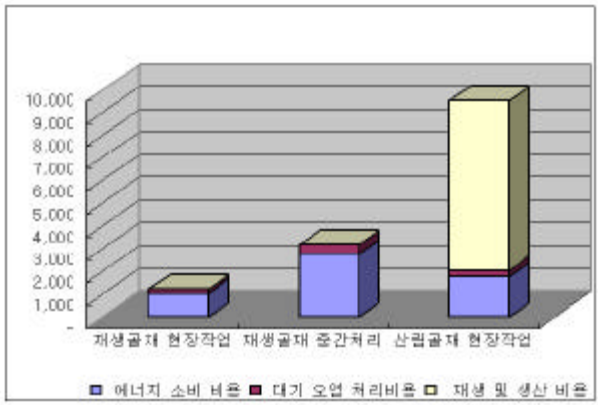
2)

(, CO₂)

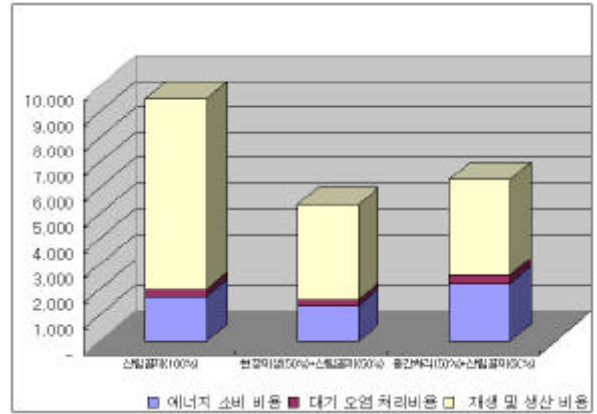
10.

(/ m³)

		1,022	2,733
		170	428
		0	0
		1,192	3,160
			9,527



2.



3.

1999

25mm

4)

- 8

3

2

3)

12

4

12.

	2000	2002	2004	2006	2008	2010
(m ³)	3,622	4,318	5,050	5,505	5,837	5,507
	70%	75%	75%	75%	75%	75%
(m ³)	2,535	3,239	3,788	4,129	4,378	4,130
가(/ m ³)	6,367	6,367	6,367	6,367	6,367	6,367
()	161	206	241	263	279	263

가

,13)

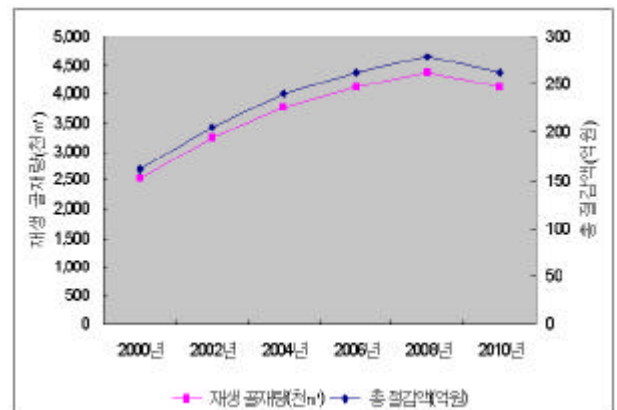
11

3

11.

	(100%)	(50%) (50%)	(50%) (50%)
	1,748	1,385	2,240
CO ₂	279	225	354
	7,500	3,750	3,750
	9,527	5,360	6,344

가



4.

13) , “ ” , 1999.12, pp. 21- 25

2004 2010 ,
 5,050 m³ 5,507 m³ ,
 75% ()
 3,788 m³ 4,130 m³ ,
 241

263

5.

가

1)

1,022 /m³, CO₂
 6.172kg/m³, 170 /m³

2)

1 , 2 ,
 2,733 /m³, CO₂ 15.492kg/m³,
 428 /m³

3)

1,748 /m³,
 CO₂ 10.126kg/m³, 279 /m³

4)

15 - 30 %

5) 2004 2010

5,050 m³ 5,507 m³ ,
 75% 3,788 m³
 4,130 m³ ,
 241 263

6)

가

1)

가

2) 가

1. , “ ”, , 1997
2. , “ ”, , 1996
3. , “ (1)”, 1997. 2
4. , “ ”, 9 6 , 1997.12
5. , “ ”, , 1996.6
6. , “ ”, 1995
7. , “ ”, , 1998
8. , “ ”, , 1999.12
9. , “ ”, 2 , 2000.5
10. (), “ ”, 1995. 4
11. , “ 가 ”, 1995.10
12. , “ ”, 1996.11
13. , “ ”, 1995. 5
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