How the Economy benefits from Coal ash utilization

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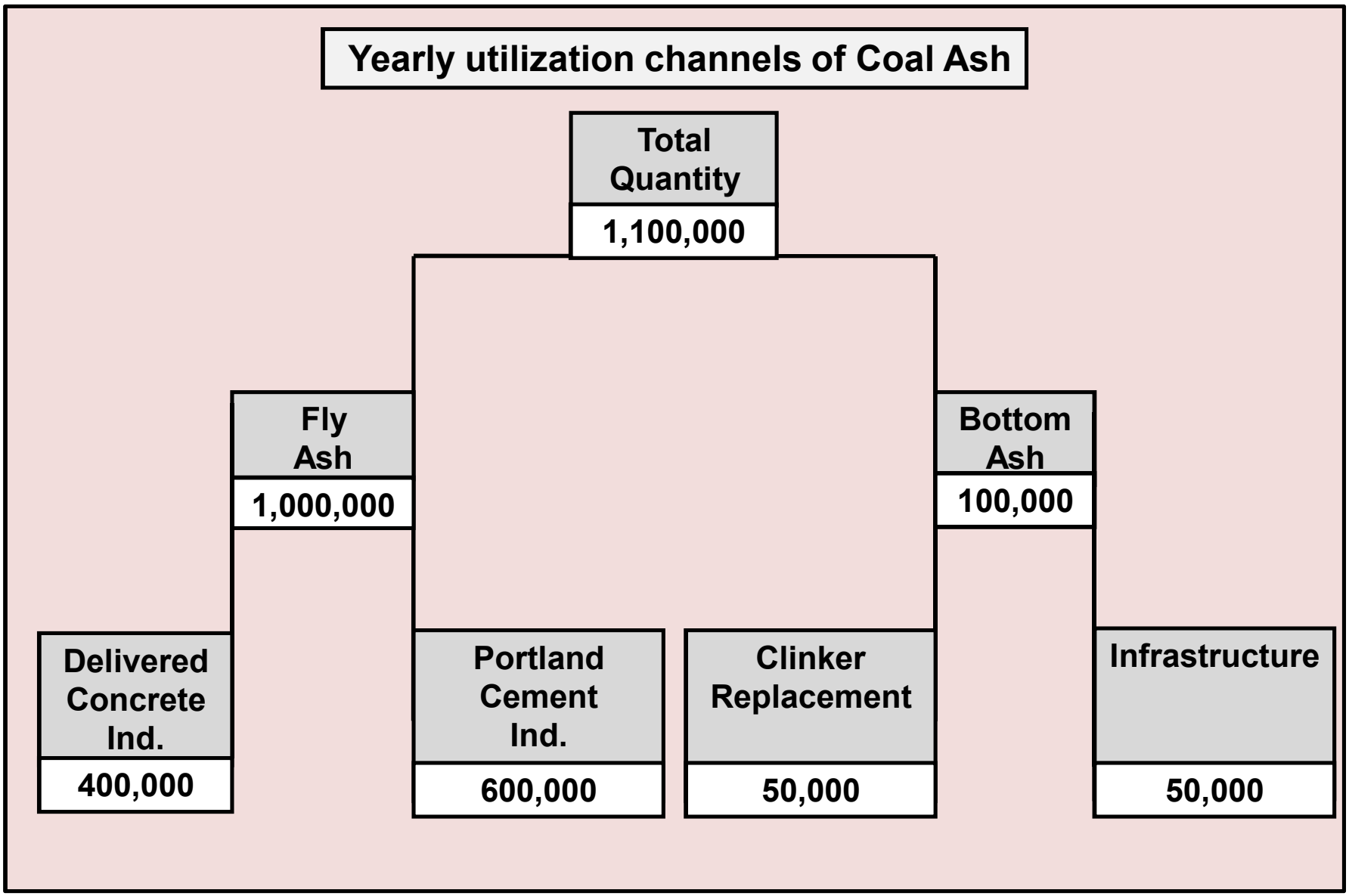
Yearly utilization channels of Coal Ash
Total Quantity
1,100,000
Fly Ash
1,000,000
Bottom Ash
100,000
Delivered Concrete Ind.
400,000
Portland Cement Ind.
600,000
Clinker Replacement
50,000
Infrastructure
50,000

Exchange Rate **1$ = 3.8 ₪**

Ingredients of 2 alternative 1 M3 Delivered concrete mixtures

	Mixture Without Fly Ash (kg)	Basic Mixture – containing Fly Ash (kg)	
Aggregates	1,350	1,350	
Sand	600	470	**Reduced by 130 kg which are replaced by Fly Ash**
Portland Cement	270	235	**Reduced by 35 kg which are replaced by Fly Ash**
Water	180	185	
Fly Ash	-	100	
	2,400	**2,340**	

Economy savings calculation (per 1 Ton Delivered concrete (NIS))

		Cost of 1 Ton	Portland Cement cost per 1 M3	Savings per 1 M3			
		₪	₪	₪			
Quarry sand		20		2.6	**Excluding delivery costs**		
Portland Cement:							
	CEM I	300					
	CEM II	260					
Mixture without Fly Ash			81.0				
Basic Mixture – containing Fly Ash			61.1				
			-	19.9			
Additional Fly Ash delivery cost		10		1.0			
		Saving per 1 M3		₪21.5			
				$ 5.7			

Total estimated economy savings

Fly Ash yearly supply (Tons)	400,000
Usage for 1 M3 (kg)	100
Potential production ('000 M3)	4,000
Total Savings	₪ 86,000,000
	$ 22,631,579

Infrastructures – Total estimated economy savings

Bottom Ash yearly supply	50,000	Tons
Average cost of Road Building materials	25	Nis
Total Savings	₪ 1,250,000	
	$ 328,947	

Typical constituents of 1 Ton Portland cement (New standard CEM II 42.5)

	%	Fly Ash percentage in the clinker	Total Coal/Fly Ash Kg
Clinker	75%	15% - 20%	131
Calcium Sulfate	5%		
Fly Ash	10%		100
Slag	10%		
Lime			
Total	**100%**		**231**

Estimated savings per 1 Ton Portland Cement Production

		Basic 1 Ton Cost
Additional Fly Ash delivery cost	₪ 2.31	₪10
Alternative cost (=Clinker)	₪37.00	₪160
Producer's raw materials cost saving	**₪34.69**	
	$9.1	

Based on approx. 650,000 Tons Fly Ash supply to the industry

Clay replacement (Tons)	Clay Cost (1 Ton)	Additional Fly Ash delivery Cost (1 Ton)	Total Savings
200,000	₪ 40	₪ 10	₪ 6,000,000
Clinker Replacement	**Clinker Cost (1 Ton)**		
450,000	₪ 160	₪ 5	₪69,750,000
		Total	**₪75,750,000**
		Estimated economy savings	**19,934,211 $**

Additional benefits:

- **Mining Elimination**
- **Clinker replacement saves saving energy needed for Clinker production**
- **Economic value of disposal sites**
- **Saving external costs related to disposal (Transportation, roads erosion, pollution Etc.)**

Cost Benefit analysis of implementing fly ash in Building

Summary of the 2005 analysis

Main Basic assumptions:

Capitalization Rate	5%
Period	80 Years
Svrt/man cost 1	100,000 $
Fly Ash yearly Quantity	1,000,000 Tons

1 Ton Fly Ash value

Disposal option :

Disposal cost	30$
Value to Delivered Cement Industry	50$
	80$
In road Building :	50$

Results ($'000):		Added Value
P.V of cost resulting from radiation doses	$184,596	
P.V of Fly Ash in building versus disposal option	$1,229,796	$1,045,200
P.V of Fly Ash in building versus road construction option	$768,623	$584,027

Estimated Economy benefits from CO_2 emission prevention

Assumptions:

1 Ton Coal Ash replaces 1.0 ton Clinker

CO_2 emission in 1 Ton Clinker production: 1 ton

Accepted 1 Ton CO_2 emission value: 14.83 Eur.
22.25 $

Total economy savings:

In Portland Cement:
450,000 Tons*$22.25 = $10,012,500
In Delivered Concrete
105,000 Tons*$22.5 = $2,362,500
$12,375,000
47,025,000 NIS

Estimated economy savings on Coal Ash utilization

	(000'$)
Disposal Elimination 1,100,000X$30	33,000
Portland Cement Production	19,934
Delivered concrete production	22,632
Infrastructures	329
CO_2 emission prevention	12,375
Less:	
Cost resulting from radiation doses	2,307
Total yearly economy savings	85,963