

**ECOSMART™ CONCRETE**  
 'a concrete contribution to the environment'™

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**Concrete for Green Building**  
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**The EcoSmart™ Foundation**

- Canadian non-profit corporation created in 1999
- Supported by the Government of Canada
- Our mission is to advance innovative technologies and practices towards sustainability and low-carbon economy
- Introduced technology solutions to reduce GHG signature of concrete (EcoSmart Concrete)
- Since 2006, EcoSmart has been actively working at introducing EcoSmart Concrete to the UAE



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**Dubai**



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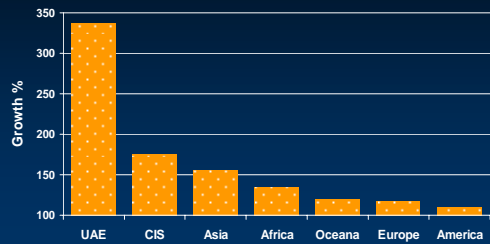
**'a very dynamic construction market'**



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**Cement**

Increase in cement consumption - percent  
 2000-2007, various regions




Region	Increase in cement consumption (%)
UAE	~340
CIS	~175
Asia	~155
Africa	~135
Oceania	~115
Europe	~115
America	~105

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**Concrete**

Concrete is a universal, versatile material.  
 Concrete is the most consumed substance on earth after water  
 1 t per person per year worldwide  
 36 t per person-yr in the Emirates



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## Concrete & Cement



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## Concrete & Sustainability

TWO QUESTIONS:

1. What is the environmental footprint of concrete?
2. How to make concrete a "green" material?



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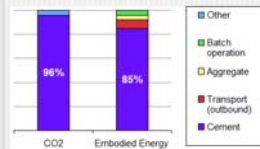
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## Concrete & Cement

About 90% of embodied energy and GHG emissions in concrete is due to OPC.



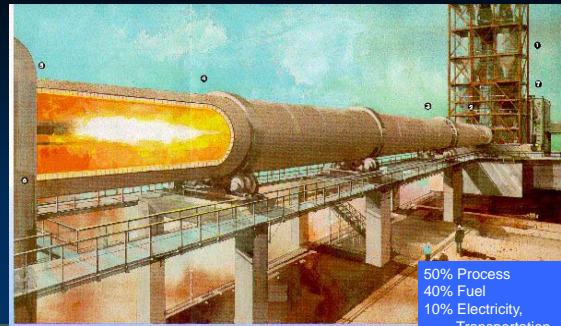
Concrete and Cement



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## One tonne Clinker, one tonne CO<sub>2</sub>



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Low fat, low sugar  
Eat ice cream less often  
Have less scoops  
Switch to sorbet

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## Sustainable Concrete

- Use less clinker in cement → SCM
- Use concrete less frequently → Durability
- Use less concrete → Higher strength
- Do not use clinker → Geopolymer, etc,...

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## EcoSmart Concrete Objectives

To minimize GHG "signature" of concrete by optimizing replacement of Portland cement with Supplementary Cementing Materials such as fly ash while improving or maintaining

- Cost
- Performance
- Constructability



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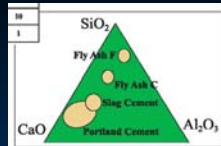
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## SCM: Zero (or low) GHG



## Cement and SCM

	Portland Cement	Slag Cement	Fly Ash C	Fly Ash F
CaO	65	45	25	3
SiO <sub>2</sub>	20	33	37	58
Al <sub>2</sub> O <sub>3</sub>	4	10	16	20
Fe <sub>2</sub> O <sub>3</sub>	3	1	7	10
MgO	3	6	7	1



	FA	SLAG
Reaction	Pozzolanic	Hydraulic
Particle Size	10 microns	Must be ground
World Availability	400 Mt/a	25 Mt/a

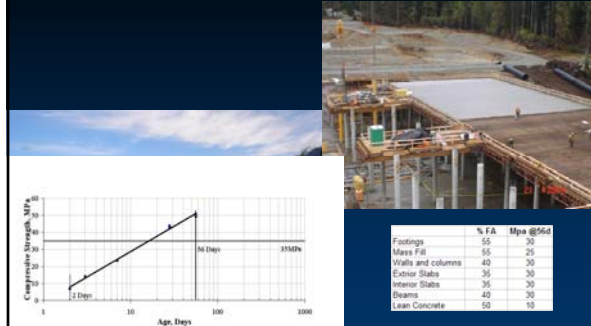
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## 50% FA



## Seymour Water Filtration Plant



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## Bayview High Rise Building

Element	Min. 28 Day Strength (MPa)	% flyash replacement (Lessor Standard)	% flyash replacement (Actual)	W/CM
Parking Slabs & Slab Bands	35	15	33	0.40
Slab on Grade Interior Parking	25	20	20	0.50
Slab on Grade Exterior	32	20	20	0.45
Core Footing	30	40	45	0.50
Other Footings	25	40	45	0.50
Shear Walls & Columns				
Foundation to 8th Floor	40	15	33	0.45
8th to 12th Floor	35	15	33	0.45
12th to 16th Floor	30	20	33	0.45
16th Floor to Roof & Other Walls	25	20	33	0.45
Tower Slabs	25	15	15 to 25	
Toppings & Housekeeping Pads	20	15	45	

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## Durability

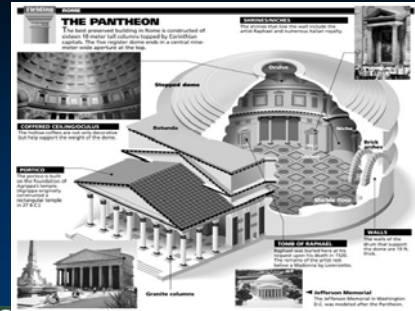


Treat Island tests

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## Durability



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## EcoSmart in the Emirates

- Started in 2006
- Supported by Canadian TEAM program
- Technical support to demonstration projects
- Test program
- Advisory Committee
- Outreach program

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## Demonstration Projects in the UAE

- DP World Tanker Jetty
- YAS Island (Ferrari Experience)
- Dubai World Trade Centre
- University Hospital Dubai
- Sadeeyat Island, AD



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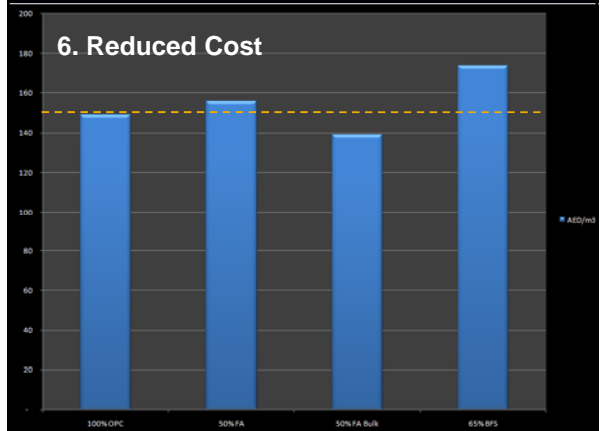
## Top six reasons to use EcoSmart Concrete in the UAE

- 6 reduced costs
- 5 higher long term strength
- 4 easier to place pump and finish
- 3 more durable and resistant to salt & sulfates
- 2 less water and cooling required
- 1 green material: less energy, resources and CO2 emissions

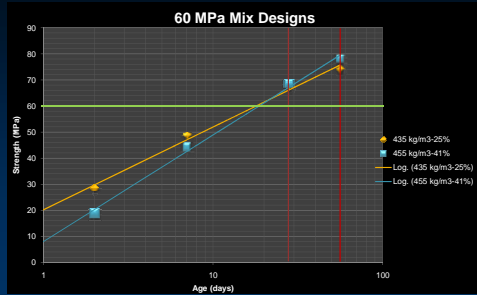
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## 6. Reduced Cost



## 5. Long term Strength



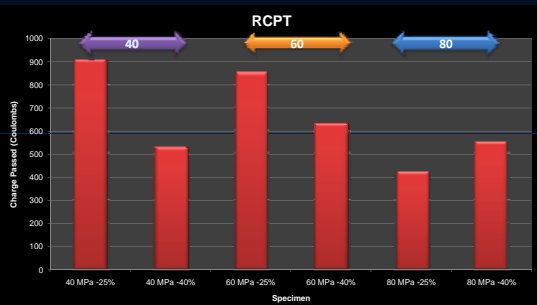
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## 4. Easier to Pump



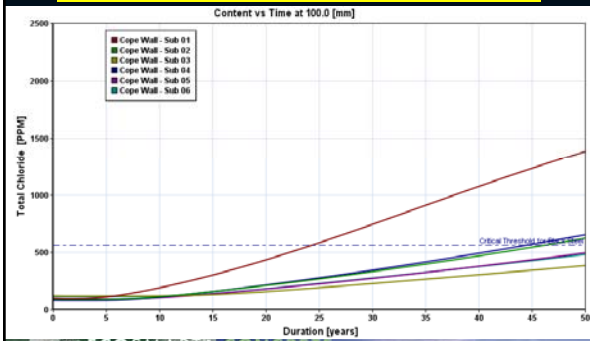
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## 3. More Durable



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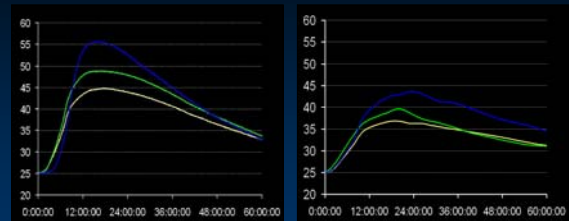
## 2. Less Water

Test Batch Code	Target Strength (MPa)	SCM content (%)	OPC (kg/m³)	FA (kg/m³)	MS (kg/m³)	Water (kg/m³)	CM	W/CM
EMD-01	40	25	255	85	0	166	340	44%
EMD-04	40	40	258	185	0	152	415	37%
EMD-02	60	25	325	110	0	148	435	34%
EMD-05	60	41	270	185	0	138	455	30%
EMD-03	80	29	360	120	30	153	510	30%
EMD-06	80	43	280	185	30	146	495	29%

Annual water saving = 7 Million m³ water

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## 2b. Less Cooling

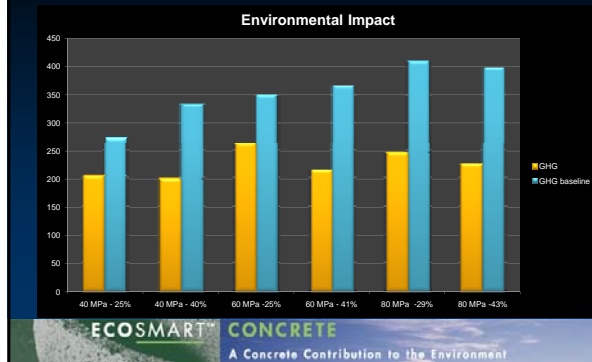


100% OPC

40% FA

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## 1. Green Material



## 1b. Green Material

The use of High Volume of SCM gives is eligible for LEED Credits



## In Conclusion

1. EcoSmart Concrete is a easy to implement and efficient green building material
2. It could be universally applied in the UAE
3. ... and it should ....

For more information:

[EcoSmartConcrete.com](http://EcoSmartConcrete.com)

