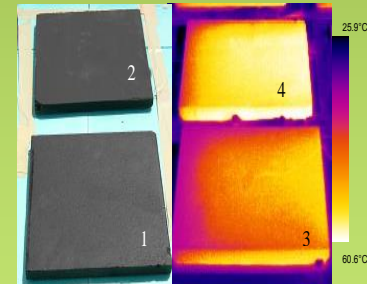




High Performance Innovations  
for Buildings & Urban Environment

# Cool Concrete Products Can be Green !



Enriching Lives Through  
Innovation

[www.abolinco.com](http://www.abolinco.com)



# CONCRETES

## What about



# 1

CONCRETES  
What about



# Concrete and the Environment



# # 2

## CONCRETES What about



- Throughout the world, concrete is one of the most important construction material.
- We use it widely for our most basic needs of shelter and infrastructure.
- All of us that inhabit planet Earth have a vested interest in this material, but also in understanding how to produce and use it more wisely and effectively.



# # 3

## CONCRETES What about



- Sustainable development means using today's limited resources in ways that do not deprive future generations from doing the same.
- Its application has multiple dimensions. It's not simply a technical or regulatory issue. To develop effective and lasting solutions requires we address all dimensions at the same time. Solving only the technical, or only the regulatory, or only the marketing issue will not bring success.
- Our aim is to develop real solutions that create sustainable value and ultimately build a clear and strong environmental image.



# 4

CONCRETES  
What about



There is increasing concern now that the choice of construction materials must also be governed by ecological considerations.



# # 5

## CONCRETES

What about



### Population Growth

At the beginning of the 20th Century, the world population was 1.5 billion; by the end of the 20th Century it had risen to 6 billion.

Considering that it took 10,000 years after of the last ice age for the population to rise to the 1.5 billion mark, the rate of growth from 1.5 to 6 billion people is remarkable.



# 6

CONCRETES  
What about



## Urbanization

At the beginning of the 20 th Century, approximately ten percent of the people lived in cities; in the year 2001 nearly three of the six billion inhabitants live in and around the cities.







# 7

CONCRETES  
What about

## Waste

Only 6% of the total global flow of materials, some 500 billion tons a year, actually ends up in consumer products whereas much of the virgin materials are being returned to the environment in the form of harmful solid, liquid, and gaseous wastes.



# 8

CONCRETES  
What about



## Environmental Impact of Technology Choices

The greatest environmental challenge today is that of the human-made climate change due to global warming caused by steadily rising concentration of greenhouse gases in the earth's atmosphere during the past 100 years.



# # 9

## CONCRETES

What about



### **Future Demand for Concrete # 1**

Ordinary concrete, typically, contains about 12 percent cement, 8 percent mixing water, and 80 percent aggregate by mass.

This means that, in addition to 1.5 billion tones of cement, the concrete industry is consuming annually 9 billion tones of sand and rock together with one billion tone of mixing water.



# 10

CONCRETES  
What about



## Future Demand for Concrete # 2

The 11.5 billion tones-a-year concrete industry is thus the largest user of natural resources in the world.

The demand for concrete is expected to grow to approximately 18 billion tons (16 billion tones) a year by 2050.



# 11

CONCRETES  
What about



### Future Demand for Concrete # 3

The mining, processing, and transport of huge quantities of aggregate, in addition to billions of tons of raw materials needed for the cement manufacture, consume considerable energy and adversely affects the ecology of virgin lands.

Both in developed and developing countries, gigantic construction projects are underway in the metropolitan areas not only for new construction but also for rehabilitation or replacement of existing structures.



# 12

CONCRETES  
What about



## Portland cement and CO<sub>2</sub>

Portland cement is a product of an industry that is not only energy-intensive but also responsible for large emissions of CO<sub>2</sub> -- a major green-house gas.

The manufacture of one ton of Portland-cement clinker releases a ton of CO<sub>2</sub> into the atmosphere.

The world's yearly cement output of 1.5 billion tones of mostly Portland cement, accounts for nearly 7 percent of the global CO<sub>2</sub> emissions.



# # 13

## CONCRETES What about



- With the attention on climate change, regulatory discussion has focused on the subject of cement's CO<sub>2</sub> footprint.
- We cannot avoid this “narrow” subject. But we do aim to broaden the “discussion” on the what is far more relevant to sustainability solutions for concrete structures.

**From:**

*CO<sub>2</sub> footprint  
of cement*

**To:**

*Eco-footprint  
of concrete structures*





# # 14

## CONCRETES

What about

### **Towards to a Sustainable Impact of Concrete structures**

Our technical approaches and solutions focus on the following social values promoted by increased environmental issues such as climatic change, regulatory issues such as energy preservation codes, technological issues such as available technologies today and social issues such as cost and quality of life.

- ✓ Resource efficiency
- ✓ Better environment
- ✓ Longevity/durability
- ✓ Esthetics
- ✓ Societal connectivity





# # 15

## CONCRETES What about



- **Social values**

- ✓ Resource efficiency
- ✓ Better environment
- ✓ Longevity/durability
- ✓ Aesthetic
- ✓ Societal connectivity

### **Our technical approaches and solutions provide:**

- Water and energy resources use reduction
- CO<sub>2</sub> and Green Gases emissions reduction
- Enhanced product durability, structure longevity
- Environmental benefits without sacrificing colors
- Better quality of life, money savings



# 16

CONCRETES  
What about



## Added value products and services with added value environmental benefits!

- We here at Abolin Co Greece and U.G.I Cyprus are ready to support you in developing and supplying concrete products to your customers with optimized environmental benefits without compromising mechanical performances or aesthetic preferences.
- Our product solutions are based on cutting edge technologies, optimized by our long experience and technical expertise and are addressed in a number of desiring and demanding applications of the construction industry.



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CONCRETES  
What about

# Applications > Roof Tiles

BUILDINGS



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## Applications > Roof Tiles *GENERAL # 1*

**Concrete roof tiles** are a durable water-shedding material that most often last the lifetime of a building. Concrete roof tiles simulate the appearance of traditional clay tiles, wood shake, slate, and stone.

### **Concrete roof tiles offer:**

- ✓ **Lifetime performance.** Concrete roof tiles generally last the lifetime of a building, typically carrying a limited lifetime, non-pro-rated, transferable warranty. There are examples of concrete tile roofs that are over 100 years old and still performing well.
- ✓ **Economical cost.** Concrete tile is more economical than other roofing products on a life-cycle basis. Concrete tiles have grown more competitive in price, due in part to the rising costs of roofing products produced from petroleum (such as asphalt shingles).

<http://www.concretethinker.com/applications/Roof-tiles.aspx>





## Applications > Roof Tiles *GENERAL # 2*

### Sustainability

- ✓ **Disaster Resistance.** Concrete tiles are Class A fire rated. Concrete tiles are resistant to damage from hail and high winds, typically achieving a minimum of a Class 3 hail resistance rating. Concrete tiles can sustain winds in excess of 125 miles per hour that would strip off most other roofing materials. Testing has also shown concrete tile roofing systems, when installed according to building code standards, exceed current seismic load requirements for building materials.
- ✓ **Durability.** Reduced resource requirements for replacements due to natural disasters, wind-driven rain, moisture damage, and vermin.

<http://www.concretethinker.com/applications/Roof-tiles.aspx>



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## Applications > Roof Tiles *GENERAL # 3*

### Considerations

- ✓ **Installation.** Concrete roof tiles are designed to last the lifetime of a building. Make sure the product you choose is appropriate to your climate and will withstand the natural forces that could affect the roof. Also, be sure to select an installer familiar with the particular manufacturer's specifications for quality.
- ✓ **Maintenance.** A yearly visual inspection of a concrete roof can help protect against accumulation of leaf debris in the valleys, or moss growth that could create a damming effect with rain. Moss and algae do not harm concrete tiles, but periodic cleaning with a power washer by a professional can remove them. After periods of high winds, earthquake, or extensive hail, a visual inspection of the roof should also be made to ensure that there are no cracked, broken, or loose tiles needing replacement. Similar maintenance is recommended for any type of roof cladding.

<http://www.concretethinker.com/applications/Roof-tiles.aspx>





## Applications > Roof Tiles *GENERAL # 4*

### What is Energy Performance?

The operational energy use and associated emissions to air during the life of the building is 85 to 95% of the total energy and emissions (including that embodied in construction materials and used for maintenance). Saving energy reduces the use of natural resources as fuel, the need for additional power plants to generate electricity, and the energy and emissions associated with obtaining and using these fuel sources.

Buildings are designed to meet occupants' needs for thermally comfortable, well-lit, well ventilated spaces. Energy in buildings provides for lighting, appliances and equipment, and service hot water. It is also used to condition interior spaces with ventilation and temperature control. Energy used for temperature control provides heating, cooling, and circulation. Energy performance also includes the sizing and efficiency of the heating, ventilating, and air-conditioning (HVAC) equipment. The predominant fuel source for heating is natural gas, although fuel oil and electricity including heat pumps are also common. The predominant method of cooling is with electricity.

<http://www.concretethinker.com/applications/Roof-tiles.aspx>





## Applications > Roof Tiles *GENERAL # 5*

### What is Thermal Mass ?

Thermal mass is a property that enables building materials to absorb, store, and later release significant amounts of heat. Buildings constructed of concrete and masonry have a unique energy-saving advantage because of their inherent thermal mass.

These materials absorb energy slowly and hold it for much longer periods of time than do less massive materials. This delays and reduces heat transfer through a thermal mass building component, leading to three important results.

1. There are fewer spikes in the heating and cooling requirements, since mass slows the response time and moderates indoor temperature fluctuations.
2. A massive building uses less energy than a similar low mass building due to the reduced heat transfer through the massive elements.
3. Thermal mass can shift energy demand to off-peak time periods when utility rates are lower. Since power plants are designed to provide power at peak loads, shifting the peak load can reduce the number of power plants required.

<http://www.concretethinker.com/applications/Roof-tiles.aspx>







CONCRETES  
What about

# Applications > Pave Tiles & Blocks

URBAN SPACES



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## Applications > Pave Materials *GENERAL # 1*

### Driveways, parking lots and sidewalks

- Concrete provides a durable, attractive paved surface for roads, driveways, sidewalks, and parking lots.
- Concrete driveways and parking lots are preferred over other materials primarily for their durability and appearance.
- Versatility, Texture, Color, and Flair: Concrete can be colored, stamped, or stenciled to create a variety of textures and decorative finishes, including the color and appearance of brick, tile, slate, or stone. Exposed aggregate is another popular finish.
- Concrete driveways and parking areas can be an extension of the landscaping or building design.





## Applications > Pave Materials *GENERAL # 2*

### Sustainability

- Durability—Long Life: Concrete provides a longer life than any other leading paving materials. Concrete driveways stand up to daily traffic, often for over 30 years. Concrete does not rut or shove due to traffic or warm temperatures.
- Durability—Low Maintenance: No annual seal coating is required for concrete driveways. Choosing concrete for parking areas means lower maintenance costs—less sealing, re-striping, resurfacing, and loss of business during maintenance operations.





CONCRETE



Is this Enough?

Towards to a Sustainable Impact of  
Concrete structures...

**Its time to make the world cooler !**



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### Introduction #1

There are three main ways to stop global warming and climate change from getting worse and that will, one hope, enable us to manage our global temperature:

- a) To reduce emissions of greenhouse gases (GHGs),
- b) To sink carbon from the atmosphere in forests and oceans,
- c) To reduce solar heating of the lower atmosphere

The first two are well known but the third is often not considered. There are quite a few methods that have been suggested to utilize albedo, a surface or an object's reflectivity, to reflect the Sun's energy and cool the Planet.



### Introduction #2

It is considered that the dark surface of buildings and pavements is one of the major heat sources causing the urban heat islands, as it absorbs more heat from the sun.

Cool Roofs and Pavements are a means of reducing the urban heat island effect. The term refers to materials chosen to reduce pavement temperature by increasing pavement reflectivity or controlling temperature by other means through choice of materials and engineering design.

Pavements are critical to transportation in all of its aspects – walking, riding in passenger vehicles, carrying goods in commercial vehicles, providing mobile services, and parking. They account for a significant percentage of the land surface in an urban area.



### Introduction #3

By altering land-cover, pavements have important localized environmental effects in urban areas. As with roofing materials, paving materials can reach 70° C in daytime, radiating away this excess heat during both day and night into the air in the urban canopy layer (as well heating stormwater that reaches the pavement surface). Due to the large area covered by pavements in urban areas, they are an important element to consider in heat island mitigation.

In the following pages we present some succeed projects in Greece level, which basically refer to cool pavement applications. The core target of the specific projects, in terms of sustainability, was the increasing of the treated area surface by 0, 2. For each Project there is an estimation of the CO<sub>2</sub> equivalency offset.

## SAINT THOMAS SQUARE – ATHENS

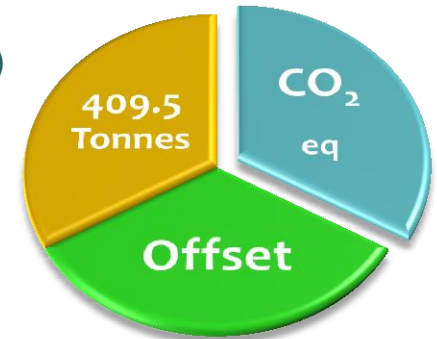
**PROJECT NAME:** REGENERATION OF SAINT THOMAS SQUARE WITH BIOCLIMATIC CRITERIA (July 2010)

**AUTHOR:** MUNICIPALITY OF ATHENS

**CONTRACTOR:** MATHAIOS TECHNICAL COMPANY

**PROJECTS PRODUCT CHARACTERISTICS:** APPLICATION OF COOL GREY CONCRETE PAVE BLOCKS

**TOTAL SURFACE:** 12.500 SQUARE METERS



### TECHNICAL SPECIFICATIONS AND PLANNING:

The project's proposal had drafted from Abolin Co and the technical service department of the municipality of Athens. The approval of the proposal is implemented through the "REGENERATION FOR URBAN AREAS PROGRAM ATTIKI 2007-2013" and the contract is co-funded by the European Regional Development Fund and by national resources through the "Public investment Program" as well as by own resources of the municipality of Athens. The technical specifications are based on the temporary national technical standard PETEP 03 11 20 00.

### TEST MEASUREMENTS AND STANDARDS:

**SOLAR REFLECTANCE:** SR VALUE = 0, 60

**INFRARED EMMITANCE:** E VALUE = 0, 90



# SUCCESS STORIES - PAVEMENTS

## FANEROMENIS AVENUE HOLARGOS – ATHENS

**PROJECT NAME:** REFORMATION OF FANEROMENIS AVENUE (September 2010)

**AUTHOR:** MUNICIPALITY OF HOLARGOS

**CONTRACTOR:** KAT CONSTRUCTIONS

**PROJECTS PRODUCT CHARACTERISTICS:**

APPLICATION OF COOL and PHOTOCATALYTIC CONCRETE PAVE BLOCKS AND TILES

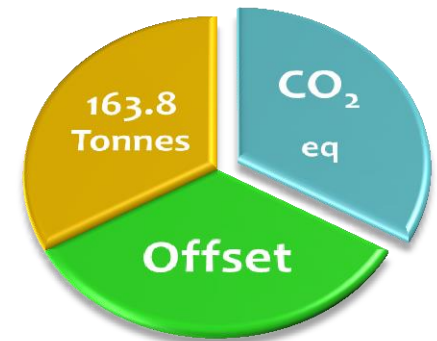
**TOTAL SURFACE:** 5.000 SQUARE METERS

**TECHNICAL SPECIFICATIONS AND PLANNING:**

The project's proposal had drafted from Abolin Co. and the technical service department of the municipality of Holargos. The approval of the proposal is implemented through the "GREEN LIFE IN CITY PROGRAMM" and the contract is co-funded by the European Regional Development Fund and by national resources through the "National Strategic Reference Frame 2007 -2013 Program" as well as by own resources of the municipality of Holargos. The technical specifications are based on the temporary national technical standard PETEP 03 11 20 00.

**TEST MEASUREMENTS AND STANDARDS:**

The solar reflectance of the cool pave blocks and tiles measured according to the ASTM E903-96 and ASTM G159-98. The infrared emittance of the cool blocks and tiles measured was measured according to the ASTM E408-71 (2002) Projects Requirements: SOLAR REFLECTANCE VALUE more than 0, 60 & INFRARED EMITTANCE more than 0, 80.



# SUCCESS STORIES - PAVEMENTS

## KONSTANTOPOULOU AVENUE KESARIANI - ATHENS

**PROJECT NAME:** REFORMATION OF IROS KONSTANTOPOYLOY (August 2010)

**AUTHOR:** MUNICIPALITY OF KESARIANI

**CONTRACTOR:** SYMBOLO ATE

**PROJECTS PRODUCT CHARACTERISTICS:**

APPLICATION OF COOL CONCRETE PAVE BLOCKS AND TILES

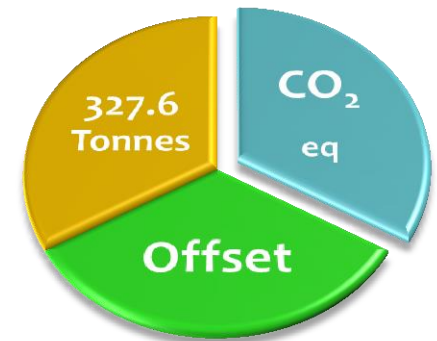
**TOTAL SURFACE:** 10.000 SQUARE METERS

**TECHNICAL SPECIFICATIONS AND PLANNING:**

The project's proposal had drafted from Abolin Co. and the technical service department of the municipality of Kesariani. The approval of the proposal is implemented through the "National Strategic Reference Frame 2007 -2013 Program" as well as by own resources of the municipality of Kesariani. The technical specifications are based on the temporary national technical standard PETEP 03 11 20 00.

**TEST MEASUREMENTS AND STANDARDS:**

The solar reflectance of the cool pave blocks and tiles measured according to the ASTM E903-96 and ASTM G159-98. The infrared emittance of the cool blocks and tiles measured was measured according to the ASTM E408-71 (2002). Projects Requirements: SOLAR REFLECTANCE VALUE more than 0, 50 & INFRARED EMITTANCE more than 0, 80.



# COOL BARRIER DESERT MIX POWDER TECHNOLOGY

## Desert Mix For Cool Concrete Designs

Two concrete based materials can be identical in visible color, yet have very different reflectance characteristics in the Infrared spectrum. The object that reflects IR-light will remain cooler than the object that absorbs it. And because IR-light comprises fully half of sunlight, the IR-reflectivity of an object is even more important than its color when it comes to heat build-up. In other words, concrete based materials with Cool Barrier Desert Mix don't have to be white to be cool..

## Working with you

Abolin's Desert Mix team can bring you excellent infrared reflectance. We also offer technical support and advice about how to integrate Desert Mix powder into your systems. By working together we can help transform your range of products towards energy performance solutions. Using expert knowledge and skill we work with you to help achieve the color you require and the solar reflectance you need.



# PRODUCT APPLICATIONS IMAGES





# Cool Barrier Technology:

## BENEFITS:

- ✓ Saves energy by decreasing the needs for cooling
- ✓ Improves thermal comfort conditions
- ✓ Contributes in CO<sub>2</sub> emissions reduction
- ✓ Contributes in Global Warming consequences mitigation
- ✓ Increase the durability of the product and longevity of the structure
- ✓ Peak Demand Reduction





*Thank you for your attention !*



Urbanus Green Innovations Ltd

*Urbanus Green Innovations Cyprus Ltd (U.G.I Cyprus) operates as a sustainable management consultant and as a raw materials supplier. U.G.I focuses on the promotion of specifications and standards into national and local construction codes and on the supply of high performance raw materials for the industrial and construction sector.*



*Cool and Photocatalytic Construction Materials  
Manufacturer, Athens Greece*

Prokopis Perdikis Abolin Co  
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