

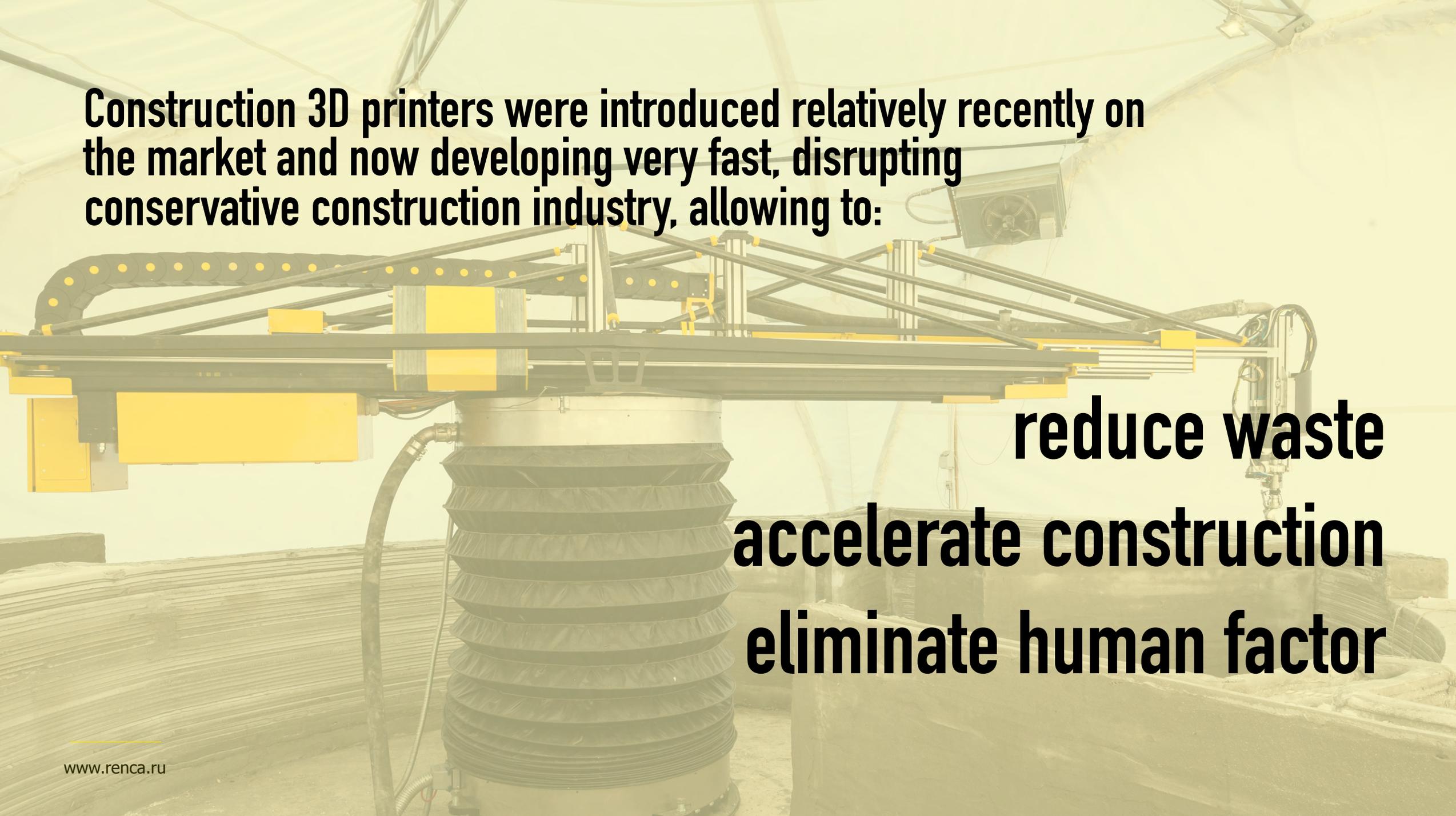


BREAKTHROUGH BUILDING TECHNOLOGIES



3D printing: disrupting construction industry





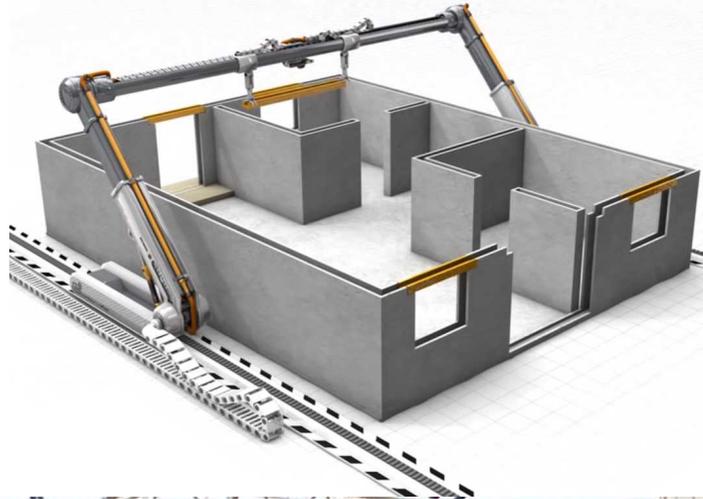
Construction 3D printers were introduced relatively recently on the market and now developing very fast, disrupting conservative construction industry, allowing to:

reduce waste

accelerate construction

eliminate human factor

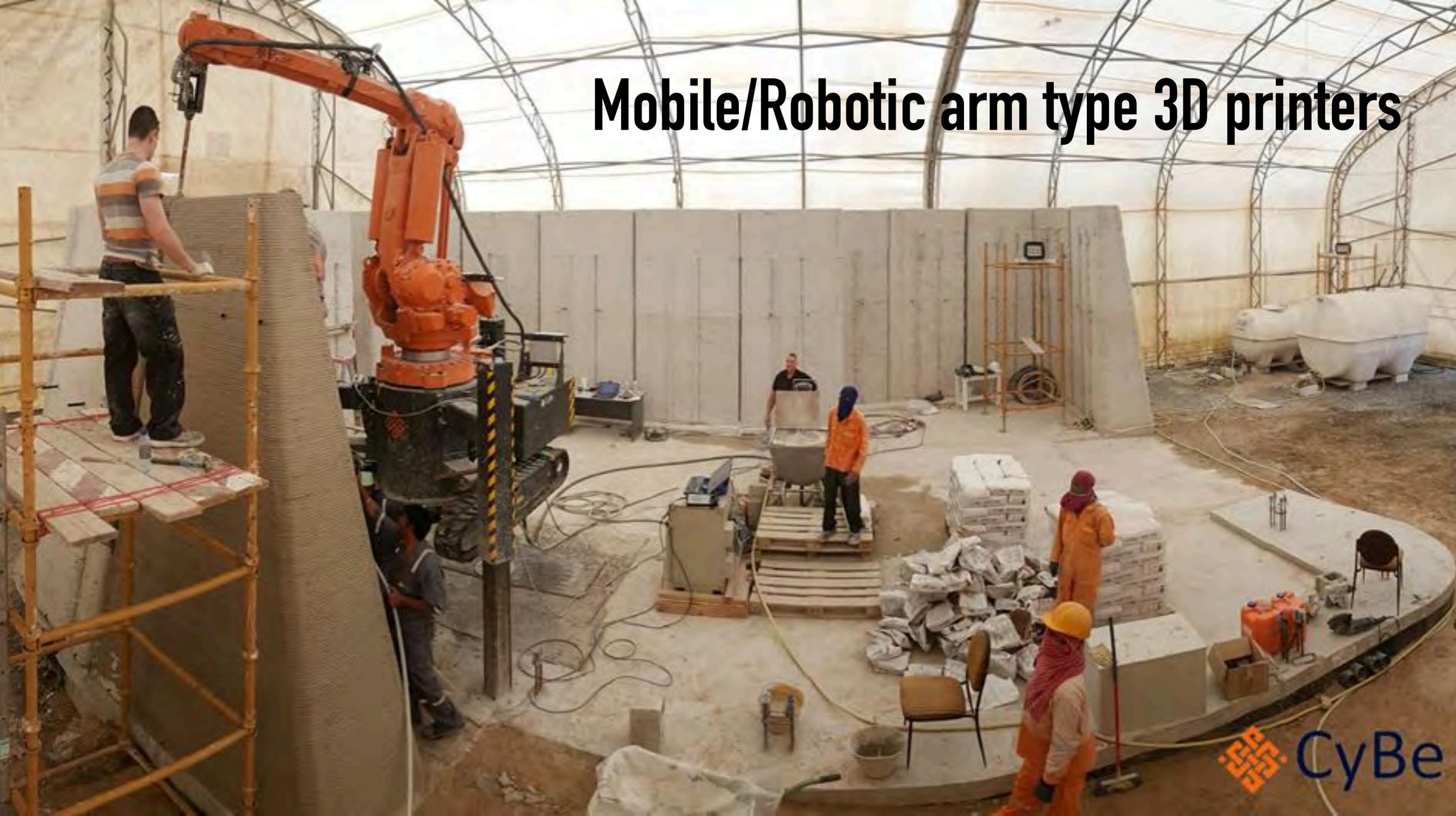
Portal type 3D printers



Mobile Crane type 3D printers



Mobile/Robotic arm type 3D printers



Mobile/Robotic arm type 3D printers

Challenges that all 3D printers face with:

Converting architectural drawings into the 3D printer language

Constant supply of concrete to printing nozzle

The need of automatic mixing and supplying of the concrete

The proper mix, suitable for 3D printing with stable properties and parameters

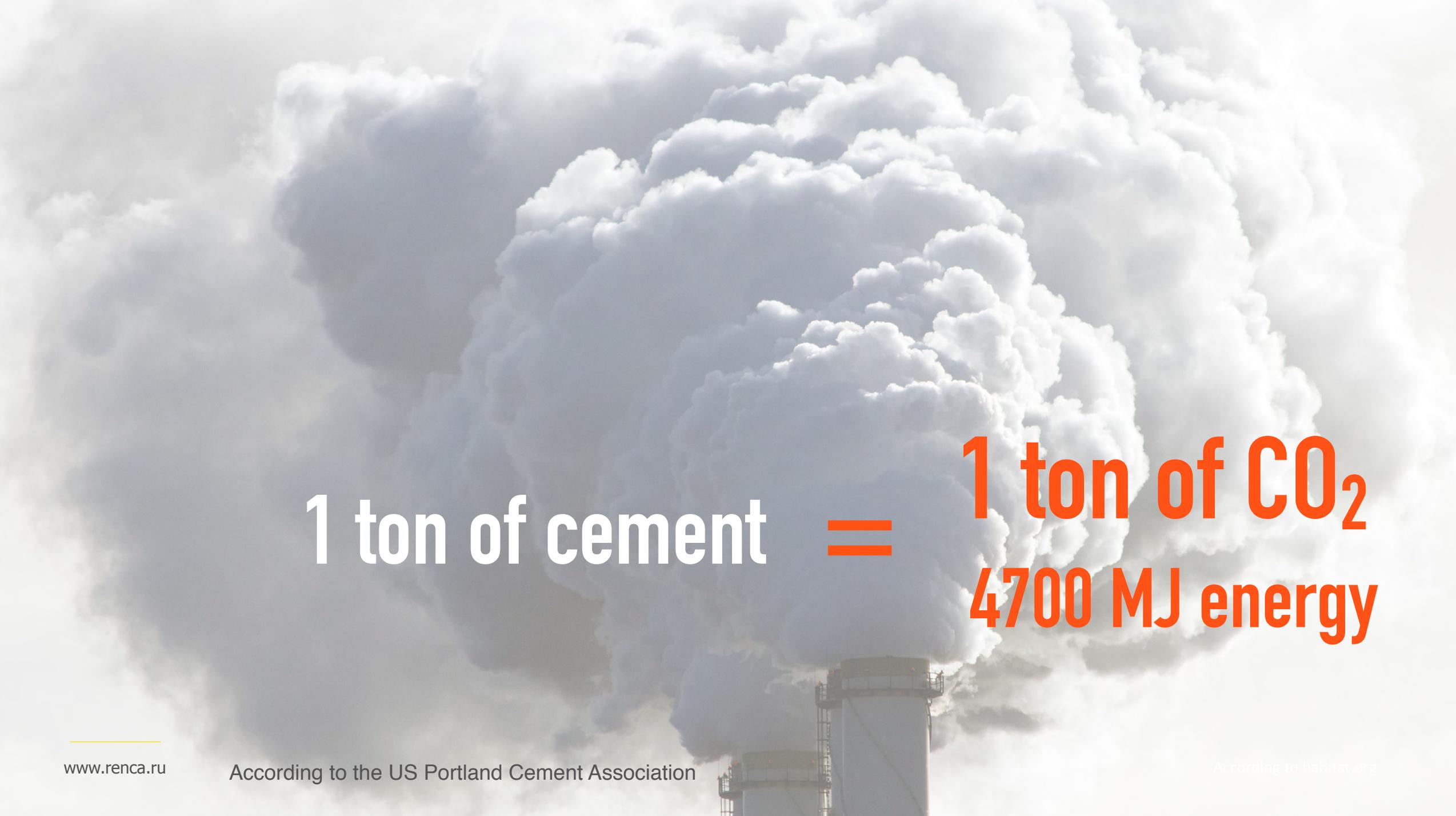




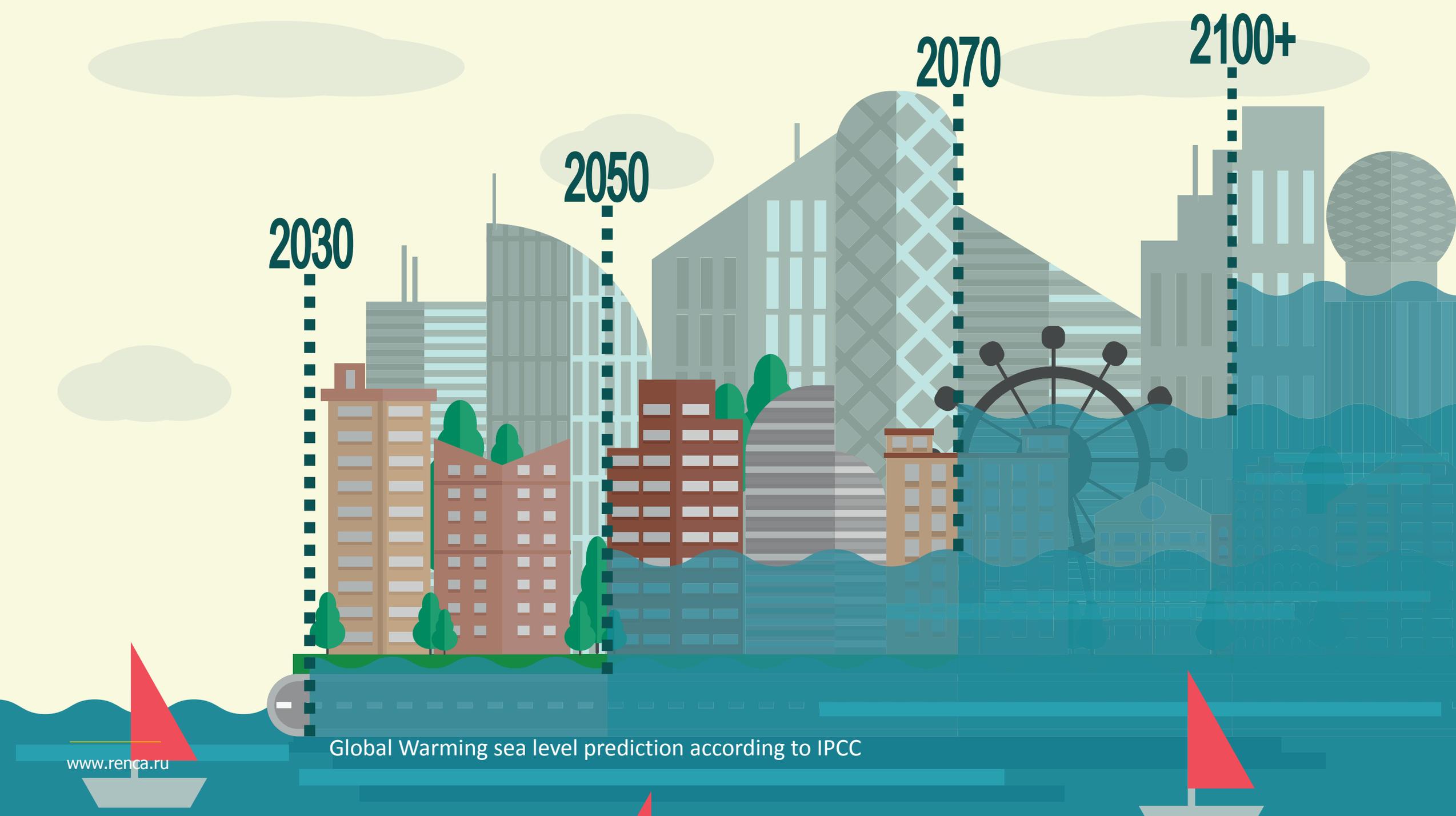
Sustainable 3D printing

Why geopolymer concrete is the best material for construction 3D printing?





**1 ton of cement = 1 ton of CO₂
4700 MJ energy**



2030

2050

2070

2100+

According Geopolymer Institute for 1 ton of Fly-Ash based geopolymer 50 kg CO₂ for OPC 1020 kg of CO₂ per 1 ton.

10X
less
CO₂

**Geopolymer
Technology**

10X
less
energy

Main operational parameters for 3D:

Short setting time

Fast hardening

Good workability

Thixotropy

High compressive / flexural strength

Using geopolymers you can easily reach the desired parameters, without adding expensive additives and reaching even better properties in terms of:

-  fire resistance
-  chemical resistance
-  waterproof properties
-  thermal resistance

Price comparison of geopolimer for 3D printing and Portland cement based mix:

Geopolymer concrete for 3D printing is **20-40% cheaper** than Portland cement based mix with the same properties depending on the availability of raw materials and the region.

Dubai Future Accelerators program



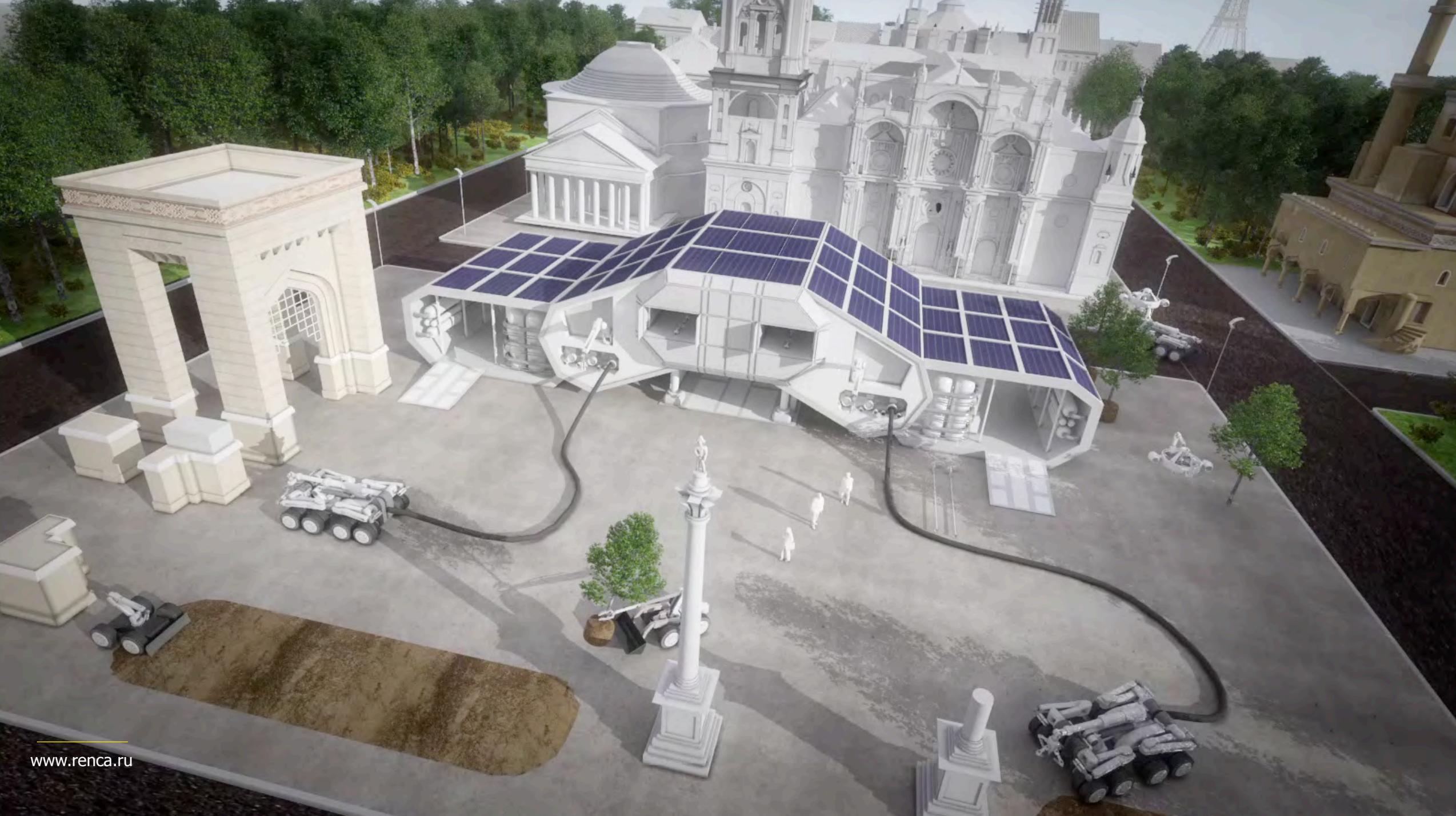
The Dubai Future Accelerators is an intensive program that pairs top companies and cutting-edge entrepreneurs with powerful partners in Dubai to create breakthrough solutions. Launched by Sheikh Hamdan, Crown Prince of Dubai and Chairman of the Dubai Future Foundation, in line with the directives of His Highness Sheikh Mohammed Bin Rashid Al Maktoum, Prime Minister of the UAE and Ruler of Dubai, the program explores and develops the technologies of the future and employs them to resolve the challenges of the 21st century.

It aims to create a global platform to attract the brightest minds from around the world to find creative solutions for the challenges of the future and implement them in the city of Dubai. The inaugural program, which finished in December 2016, created \$33m in commercial partnerships and pilot programs.



www.dubaifutureaccelerators.com





OBJECTIVE

“25% of Dubai’s buildings will be 3D printed by 2030”

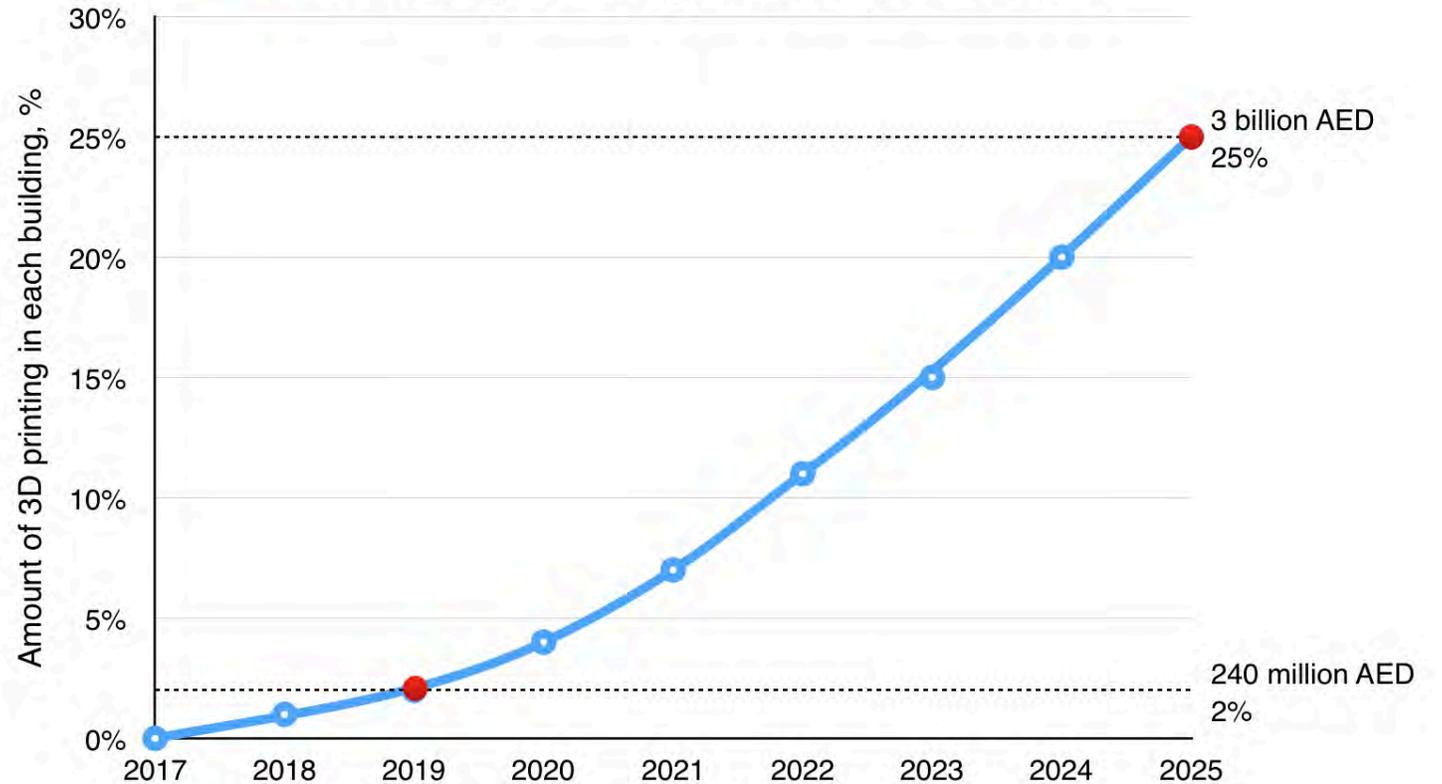
UAE Vice President, Prime Minister and Ruler of Dubai,
His Highness Sheikh Mohammed bin Rashid al-Maktoum

2% of building must be 3D printed by 2019

NEW EMERGING MARKET

ESTIMATED MARKET GROWTH: **3 billion AED (1 bln. EUR)**

○ % 3D printing in construction



Market growth only in Dubai according to gulfnews.com

OBJECTIVE

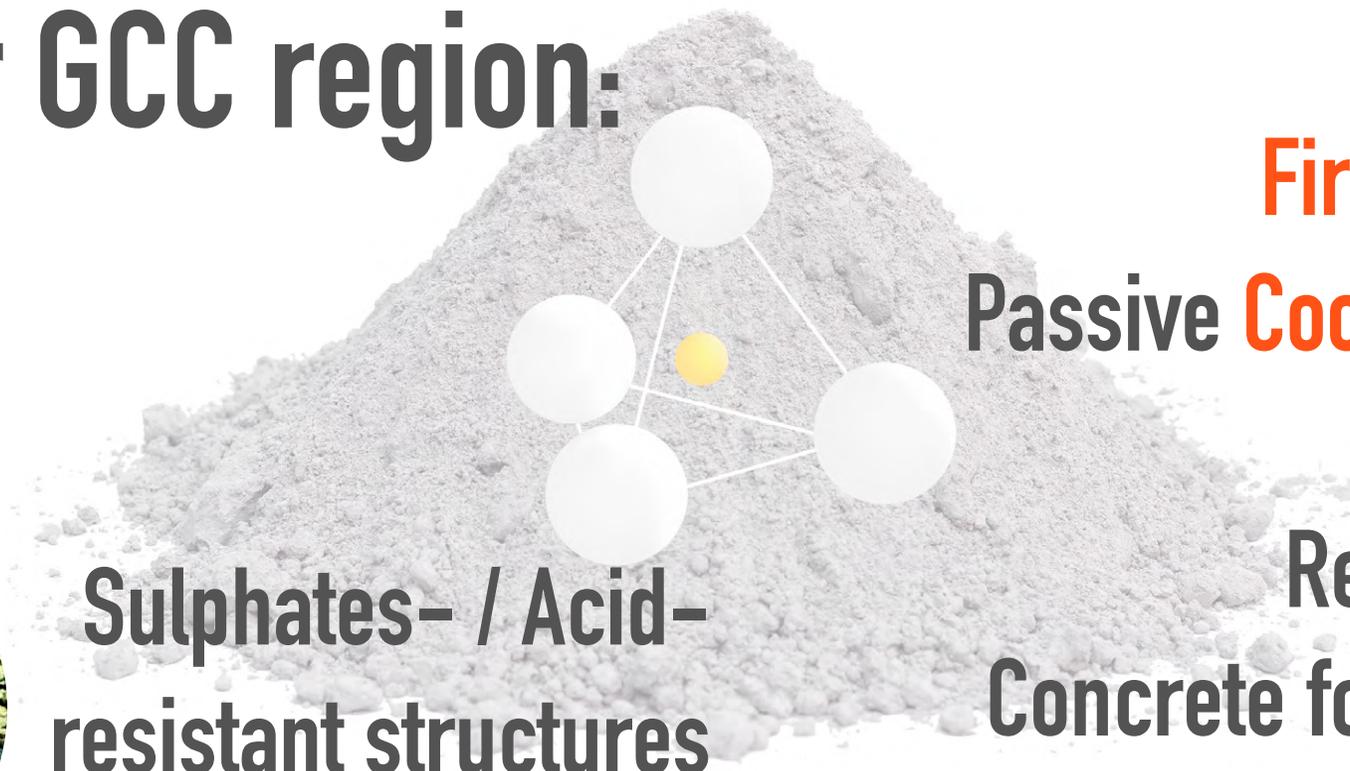
According to Al Sa'fat evaluation system, each building should meet the **green building requirements** and existing buildings should be **retrofitted** to fit this regulations.



Products based on geopolymer technology by Renca for GCC region:



Sulphates- / Acid-resistant structures for seashore



Fireproof foams
Passive Cooling Systems
UHPGPC
Repair mortars
Concrete for 3D printing



Geopolymer
Concrete

After 28 days in
10% Sulphuric
Acid Solution:

OPC
40% weight loss
70% strength loss



Ordinary Portland
Cement Concrete

GPC
0% weight loss
0% strength loss

ACID resistant geopolymer concrete

Sustainable 3D printing

We have successfully used geopolymers concrete in construction 3D printing together with automatic mixing system, developed by our company, we make construction faster, safer and cleaner, providing stable properties and avoiding human factor.

Dubai Central Laboratory certification test results:



Dubai Central Laboratory
Construction Materials Laboratory Section - Structural Unit
TEST REPORT
SETTING TIME OF CEMENT

Report No:	100056082	Request No:	EMTX-2017-021163
Project No:	PS17-1076	Report Date:	10/04/2017
Project Name:	TESTING SERVICE FOR RENCA RUS		
Consultant:	NA		
Contractor:	RENCA RUS		
Location:	DUBAI		
Source:	NOT GIVEN		
Sample Description:	MORTAR		
Sampling Date/Time:	05/04/2017 08:00 AM	Lot Number:	NG
Receiving Date/Time:	06/04/2017 08:00 AM	Lot Size:	NG
Sample Size:	16 kilogram	Sender No:	GP3D
Material/Mix type:	3D GEOPOLYMER CONCRETE	Laying Date/Production Date:	
Nominal Size / Working Block Size L * T * H (mm) :			

TEST RESULTS

PARAMETERS	RESULTS
CLASS OF CEMENT	N/A
INITIAL SETTING TIME (MIN)	50
FINAL SETTING TIME (MIN)	60

Sampled By:	Andrey Dudnikov (supplier)	Tested By:	JVBRIONES
Samples Brought By:	Andrey Dudnikov (supplier)	Testing Date:	06/04/2017 17:08 PM
Sampling Method:	NOT GIVEN	Sampling Report No:	
Test Method:	BSEN 196 -3 : 2005 + A1 :2008 CLAUSE 6.	Test Method Variation:	NIL

Remarks:
1- PRODUCT NAME - RENCA 3D GEOPOLYMER CONCRETE
2- ACTUAL SETTING TIME - INITIAL 48 MINUTES & FINAL 50 MINUTES
3- MIX PROPORTION - GEOPOLYMER CEMENT (PART A) - 30.9% + SAND 57.4% + GEOPOLYMER REAGENT - GEOSILICATE (PART B) 11.7%

To verify this document please go to <http://login.dm.gov.ae/wps/portal/documentverification> and Enter Document ID: **EMTX-2017-021163** and Verification Code: **091-281** or scan the QR code below.



This Report is computer approved and authorized by Structural Unit
It does not require any signature



Dubai Central Laboratory
Construction Materials Laboratory Section - Structural Unit
TEST REPORT
COMPRESSIVE STRENGTH OF HARDENED MORTAR

Report No:	100064593	Request No:	EMTX-2017-021167
Project No:	PS17-1076	Report Date:	06/05/2017
Project Name:	TESTING SERVICE FOR RENCA RUS		
Consultant:	NA		
Contractor:	RENCA RUS		
Location:	DUBAI		
Source:	NOT GIVEN		
Sample Description:	MORTAR		
Sampling Date/Time:	05/04/2017 08:00 AM	Lot Number:	NG
Receiving Date/Time:	05/04/2017 08:00 AM	Lot Size:	NG
Sample Size:	16 kilogram	Sender No:	GP3D
Material/Mix type:	3D GEOPOLYMER CONCRETE	Laying Date/Production Date:	
Nominal Size / Working Block Size L * T * H (mm) :			

TEST RESULTS

PARAMETERS	RESULTS
TYPE OF MORTAR	3D GEOPOLYMER CONCRETE
PRODUCT NAME	RENCA 3D GEOPOLYMER CONCRETE
SPECIMEN DIMENSION (mm)	40
WATER RATION (VOL/WT)%	SEE REMARKS
PRODUCT MANUFACTURING DATE	05/04/2017
AGE AT TEST (DAYS)	28
MEAN COMPRESSIVE STRENGTH, N/mm ²	46.3

Sampled By:	Andrey Dudnikov (supplier)	Tested By:	JVBRIONES
Samples Brought By:	Andrey Dudnikov (supplier)	Testing Date:	05/04/2017 09:00 AM
Sampling Method:	NOT GIVEN	Sampling Report No:	
Test Method:	BSEN 1015-11:1999	Test Method Variation:	NIL

Remarks:
1- PRODUCT NAME - RENCA 3D GEOPOLYMER CONCRETE
2- DEMOULDING OF SPECIMEN AFTER 60 MINUTES
3- MIX PROPORTION - GEOPOLYMER CEMENT (PART A) - 30.9% + SAND 57.4% + GEOPOLYMER REAGENT - GEOSILICATE (PART B) 11.7%

To verify this document please go to <http://login.dm.gov.ae/wps/portal/documentverification> and Enter Document ID: **EMTX-2017-021167** and Verification Code: **091-287** or scan the QR code below.



This Report is computer approved and authorized by Structural Unit
It does not require any signature

MoU with Dubai Municipality



Renca signed an MOU with Dubai Municipality to provide green geopolymers, concrete and automatic mixing system for the pilot on-site 3D printed house in Dubai



The need of automatic mixing system



MOBILE MIXING PLANT:

technology and research by
Alex Reggiani and designer
Athos Reggiani



ELECTRIC AND CONTROL PANEL

AIR COMPRESSOR 300 lt/min 2,2Kw

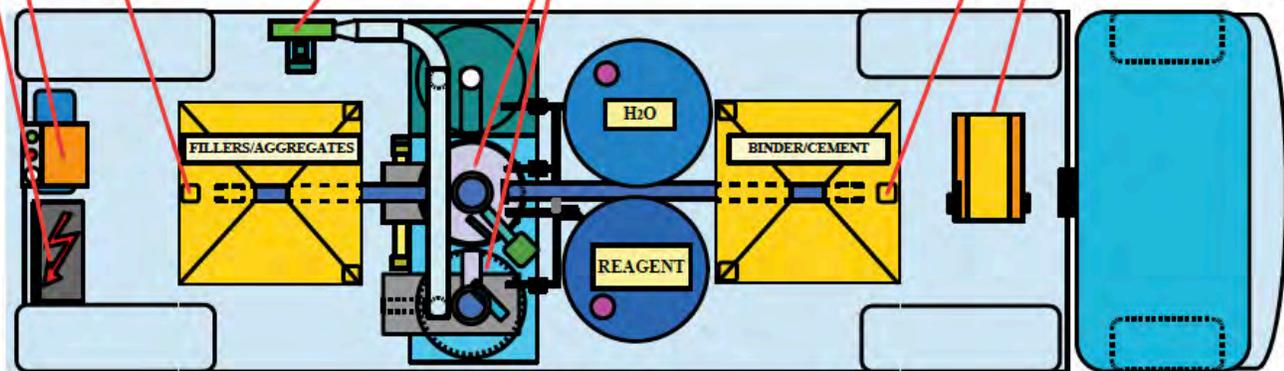
VENTILATOR 750 m³/h 1,5 Kw

LOAD SENSOR

2 MIXERS 85 LITERS VOLUME 2,2 Kwe

LOAD SENSOR

ELECTRIC GENERATOR



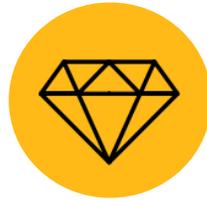
FEATURES OF MIXING PLANT:



Efficient mixing



Ease of use



Increased durability



Fast cleaning

Automatic Mixing System for Concrete

renca

RENCA deliver the all-in-one solution:

The complete system for **geopolymer cement** production

3D printers and automatic mixing system for concrete

Technology for production a wide range of **sustainable products** based on local raw materials

Architectural geopolymer concrete



High Performance Concretes

Mongol Rally 2017 @geomongol



THE RALLY

8 weeks

2 continents

20 countries

300+ cars

MONGOL RALLY is an international charity rally covering 16,000+ kilometers (1/3 of the Earth), crossing mountains, navigating deserts, passing through some of the most remote terrain on the planet, traveling from London, England, to Ulaanbaatar, Mongolia, with no set route and no back up in a 1 litre vehicle.



Mongol Rally is not just about having an insane trip and hang out with crazy people. It's also about saving the planet and making the world a better place. Each team participating in the Mongol Rally shall donate at least £1000 to charity, a half of this shall go to the Official Mongol Rally Charity - Cool Earth.

www.coolearth.org

www.geomongol.ru



WHY?

cooiearth

FUTURE IS NOW!

Contacts:

info@renca.ru

+7 495 649-02-86

www.geocement.ru

www.renca.ru

renca