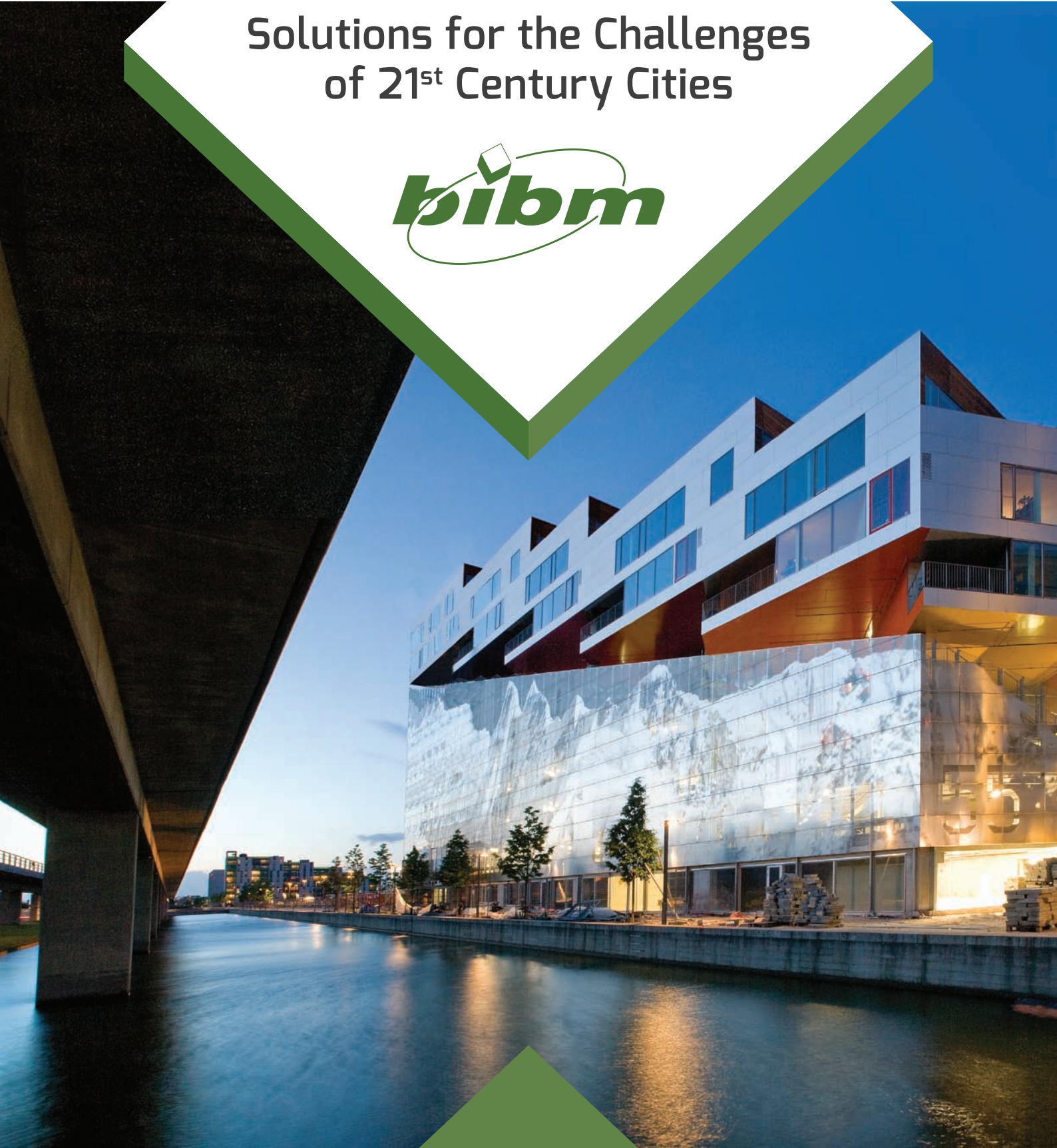


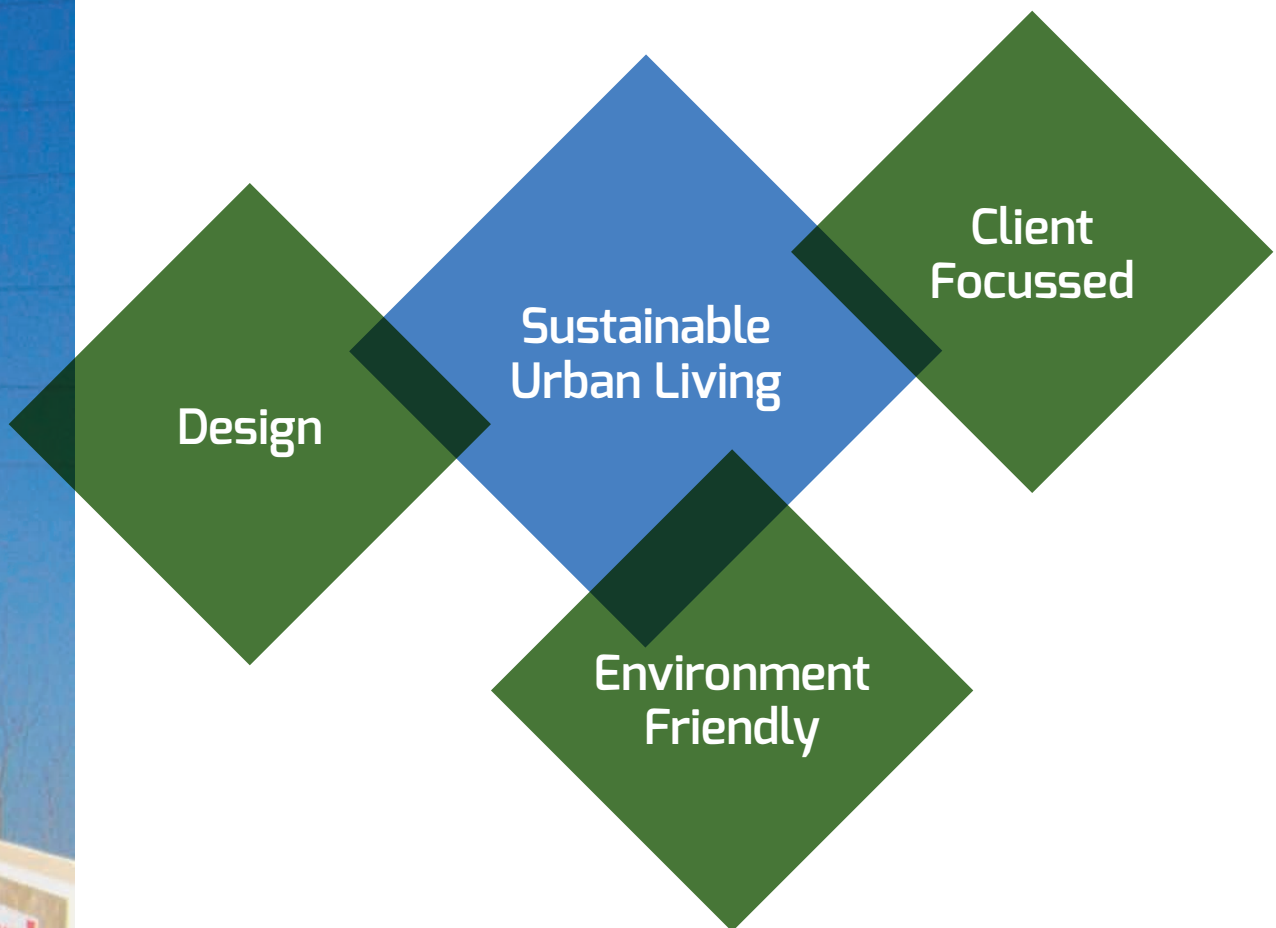
# PRECAST CONCRETE

Solutions for the Challenges  
of 21<sup>st</sup> Century Cities





# WHY PRECAST CONCRETE?



This paper gives an insight into many qualities, features and characteristics of precast concrete that are less well known than its structural strength, durability and its versatile nature. All of these result in precast concrete providing solutions for buildings and infrastructure that help create places and spaces which can be described as sustainable urban living.

**Let's find out the endless advantages of precast concrete!**



# DESIGN

## VERSATILE, INNOVATIVE, SMART MATERIAL

### Constantly evolving products

New applications and innovations are developed to satisfy new societal needs, and these applications have to fulfil technological requirements. A long list of different applications and solutions are available corresponding to changing climate conditions.

### Structural strength

Resistant, and durable, precast concrete products have an outstanding structural durability and a faultless fire resistance thanks to it being inflammable and its high thermal inertia.

The behaviour of precast concrete is also acknowledged in seismic regions. The latest version of the European design standard, Eurocode 8 - EC8 - CEN, 2004-, recognizes that precast frame structures can be designed with the energy dissipation capacity, which is essential in seismic areas.





## A smart contributor to future cities

It cleans itself when exposed to pollutants, it repairs itself in case of damage, cleans the air during its lifetime: these are only some outstanding characteristics that precast concrete can offer. Having a long lifetime and requiring low maintenance during its operational phase, it is an ideal material for smart cities. Due to its versatile characteristics, it can be used to deliver all kinds of customer needs and allows the most outstanding individual design.

## Applies the latest software modelling

Being fully automated, Building Information Modelling (BIM) allows the virtual conceptualization of the project, and “to build before building”. BIM helps to develop a collaborative work and to exploit the properties of the products and the functional characteristics of the building before and during the construction phase; and throughout its operation.





Furthermore, the integration of computer chips in precast concrete products enables product traceability, and continuous monitoring throughout the life of the building.

These actions ensure an easy maintenance of the building, high-level of customization, flexibility and better risk mitigation.

## **Versatile**

Precast concrete speaks many languages; it offers a rainbow of shapes, sizes, colours, and textures. Due to its aesthetic versatility, it is the ideal material for each architect dreaming of a universal, aesthetic and reliable material.





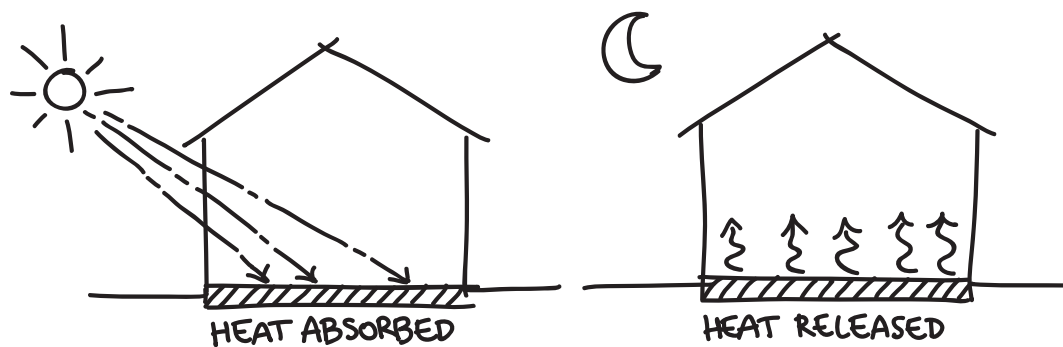


# ENVIRONMENT FRIENDLY

## ENERGY EFFICIENT

### Improved energy performance of buildings and lower CO<sub>2</sub> emissions

Due to its thermal mass, concrete allows for less heating and cooling in buildings thereby improving the energy efficiency of buildings, and lowering CO<sub>2</sub> emissions.



When the air is warm, concrete absorbs and stores unwanted heat and lowers room temperatures. When temperatures fall in the evening, concrete releases this heat. This “heat-storage effect” results in more comfortable internal room temperatures during the day in summer and a more stable temperature year round.

“Thermally activated” building systems can further enhance the effect by the use of water pipes (warm and cool water) embedded in the concrete (so-called “integrated heating and cooling systems”).

# REDUCES ENVIRONMENTAL IMPACTS

## A truly circular material and product

At the end of the life-cycle, concrete is 100% recyclable and precast concrete elements can be reused in new applications. Also, precast concrete enables buildings to be adaptable to the changing needs of the occupants thanks to its modular nature.

## Concrete has low CO<sub>2</sub> impact

From a whole life building perspective, concrete buildings often have the lowest CO<sub>2</sub> impact. When we quantify the CO<sub>2</sub> burden, it is important to take into account the whole building and the whole life cycle of products, including extraction, production & transport; building in-use; lifetime and durability; and end of life. Precast concrete can minimise the need for finishes which often need to be replaced during the life of a building, and can reduce energy demand through thermal mass.

From a global perspective, the public perception tends to forget that deforestation and agriculture (land use) related greenhouse gas (GHG) emissions account for about 30% - 50% of all man made GHG emissions<sup>1</sup>. Even though emissions related to the whole life cycle of concrete buildings is substantially less, the cement industry puts a lot of efforts into exploring new ways of production in order to reduce its carbon footprint.



## Reduces the transport distance

Precast concrete is produced using 100% regional materials and promote the “short - circuit” and the traceability of materials throughout the production chain. The production plants are situated both close to raw material sources and to the demand. Consequently, it minimises the transport distance and the emission of CO<sub>2</sub> linked to transport.

1. Nellemann, C. og Corcoran, E (red). (2010) *Dead Planet, Living Planet – Biodiversity and Ecosystem Restoration for Sustainable Development*. United Nations Environment Programme, GRID-Arendal, Arendal

Natasha Gilbert, *One-third of our greenhouse gas emissions come from agriculture (2012) – News from Nature (International Weekly Journal of Science)* web: <http://www.nature.com/news/one-third-of-our-greenhouse-gas-emissions-come-from-agriculture-1.11708> Date of access 30/11/2015



## GENERATOR OF THE REGIONAL ECONOMY

### Precast concrete is a local business

By using local, abundantly available raw materials, it contributes to the growth of the local economy and local job creation. The industry generates value not only for itself but for the whole value chain:

- ▶ By the materials and services they purchase (upstream)
- ▶ By the technical possibilities they offer (downstream)

### Creates value outside of big cities

Precast plants are very often situated close to big cities, but outside of the urban sprawl; therefore it creates value and employment in the local provincial areas while contributing to social responsibility in the regions.

The construction sector makes a huge contribution to the regional economy e.g.in terms of job creation. In particular, the concrete sector has a multiplier effect of around 2,8 ; that means that for each euro invested, 2,8€ is generated in the regional economy.





# CLIENT FOCUSSED

## EFFICIENT URBAN INFRASTRUCTURE

### Build differently

Precast concrete offers a modular, fast, and cost effective building phase which is ideal in densely populated areas. The products are manufactured in plants (finished or semi-finished assembling on site), and offer the guarantee of a constant and controlled industrial quality.

### Less disturbance in terms of traffic and noise, less waste

The industrialised construction ensures a quick building phase which means less annoyance for the citizens in terms of traffic and noise. In some countries, public works such as bridges can only be built in precast concrete, because they can be erected in one night without causing traffic congestion.

Furthermore, the assembly of completed elements creates almost no waste on the building site; thus it is cleaner and more resource efficient.



## ENHANCED WELL-BEING OF OCCUPANTS

### Offers a pleasant indoor air quality and thermal comfort

As a consequence of climate change, extreme conditions (high heat) occur more often, consequently it is more challenging to keep a pleasant indoor climate in the building.

Thermal mass reduces the need for mechanical cooling; this not only reduces the use of energy, but it also ensures a better quality environment.

Precast concrete also offers a good indoor air quality because there are no VOCs (Volatile Organic Compounds) emitted into the building.

## Fire Safe

Concrete doesn't burn, thus it protects life, property and the environment in case of fire. It responds effectively to all of the protective aims set by the European legislation, benefiting everyone from building users, owners, businesses and residents to insurers and firefighters.

- ▶ Concrete does not burn and does not add to the fire load
- ▶ Concrete does not produce any smoke or toxic gases, it is smoke tight
- ▶ Due to its structural strength, it not only allows occupants to escape, but in case of fire, it provides safe means of rescue for occupants and protection for firefighters;
- ▶ It is easily repairable after fire (no water damage)



## Soundproof solutions

Precast concrete has a high noise attenuation property, thus it offers a calm and peaceful indoor environment even in big cities, close to busy roads; and its noise protection walls keep away the noise of a busy motorway from the residential areas.



## More function for less raw material use

Some precast concrete products are pre-stressed and use high-strength concrete, which results in the use of less material, therefore they put less strain on the environment and they are more economic.



## Climate resilient

Being durable and reliable, precast concrete is the ideal material to build climate resilient infrastructure to protect cities from the detrimental effects of climate change such as flooding. Pioneering solutions include permeable pavements which minimise water run off and urban flooding during storm events..

## Socially responsible

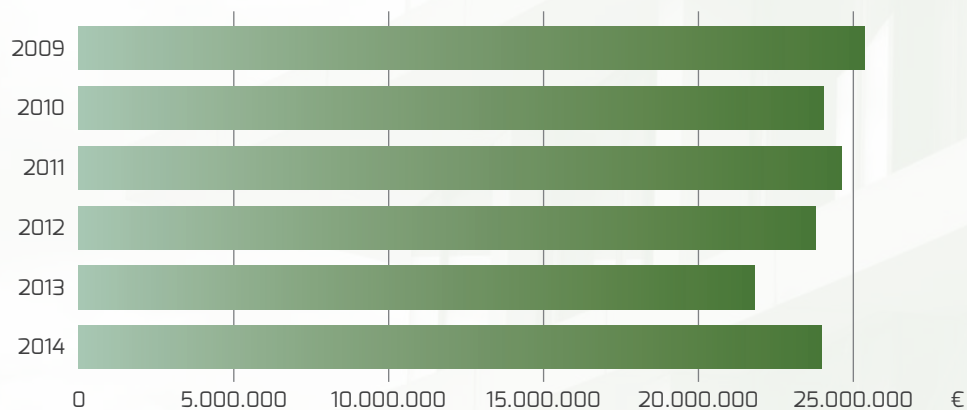
BIBM members co-signed a Health and Safety Charter and pledged to provide a healthy and safe environment for its workers. Amongst others, the resolution includes the industry's pledge to reduce risk to health and safety of all stakeholders including factory workers, visitors and neighbours, sub-contractors, logistics teams, vulnerable road users, and construction site workers using our products.



# INDUSTRY FIGURES 2014

- ▶ **164,000** employees
- ▶ ~ **8,000** production plants
- ▶ **5,500** companies
- ▶ **21** employees/plant on average
- ▶ **24** billion € of production in 2014

European Precast Concrete Production Value  
(values are expressed in thousands)



Source: Eurostat

SCANDIC VULKAN



# BIBM

BIBM is the Federation of the European Precast Concrete Industry (Bureau International du Béton Manufacturé).

BIBM contributes to the development of the Precast Concrete Industry by acting at European and international levels. It provides the major platform of the sector in Europe, coordinating common development (technical and strategic) and promoting SME friendly legislation and stable standards. Furthermore, BIBM endorses the importance of sustainability and its three pillars and maintains a network of professionals, experts and industrialists to share their experience and piece of information for the progress of the industry.

Founded in 1954, it represents 15 national associations of precast concrete. The sector employs 165,000 people in 7,000 production plants across Europe (5,000 companies). Each plant employs on average 21 employees, which confirms that precast concrete plants are primarily small and medium businesses.

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Find us on the web:





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*Think Concrete, Go Precast!*

# BIBM MEMBERS

AT	 VERBAND ÖSTERREICHISCHER BETON- UND FERTIGTEILWERKE	Verband Österreichischer Beton- und Fertigteilwerke - VÖB	<a href="http://www.voeb.com">www.voeb.com</a>
BE	 FEBE	Fédération de l'Industrie du Béton / Federatie van de betonindustrie - FEBE	<a href="http://www.febe.be">www.febe.be</a>
DK		Danish Concrete	<a href="http://www.danskbeton.dk">www.danskbeton.dk</a>
DE	 Fachverband Beton- und Fertigteilwerke Baden-Württemberg e.V.	Fachverband Beton- und Fertigteilwerke Baden- Württemberg e.V.	<a href="http://www.betonservice.de">www.betonservice.de</a>
	 VBF Nord Beton- und Fertigteilindustrie Nord	Verband Beton- und Fertigteilindustrie Nord e.V.	<a href="http://www.betonverband-nord.de">www.betonverband-nord.de</a>
	 BetonBauteile Bayern	Betonbauteile Bayern Bayerischen Industrieverbandes Steine und Erden e.V.	<a href="http://www.betonbauteile-by.de">www.betonbauteile-by.de</a>
	 konstruktiv & kreativ	Fachvereinigung Deutscher Betonfertigteilbau e.V. - FDB	<a href="http://www.fdb-fertigteilbau.de">www.fdb-fertigteilbau.de</a>
ES	 ANDECE ASOCIACIÓN NACIONAL DE LA INDUSTRIA DEL PREFABRICADO DE HORMIGÓN	Asociación Nacional de la Industria del Prefabricado de Hormigón	<a href="http://www.andece.org">www.andece.org</a>
FI		Finnish Concrete Industry Association	<a href="http://www.betoni.com">www.betoni.com</a>
FR		Fédération de l'industrie du béton - FIB	<a href="http://www.fib.org/CB/FB">www.fib.org/CB/FB</a>

IE		Irish Precast Concrete Association - IPCA	<a href="http://www.irisconcrete.ie">www.irisconcrete.ie</a>
NL		Bond van Fabrikanten van Betonproducten in Nederland - BFBN	<a href="http://www.bfbn.nl">www.bfbn.nl</a>
NO		Betongelementforeningen	<a href="http://www.betongelement.no">www.betongelement.no</a>
PT		Associação Nacional dos Industriais de Prefabricação em Betão - ANIPB	<a href="http://www.anipb.pt">www.anipb.pt</a>
SE		Svenskbetong	<a href="http://www.svenskbetong.se">www.svenskbetong.se</a>
TR		Turkish Precast Concrete Association	<a href="http://www.prefab.org.tr">www.prefab.org.tr</a>
UK		British Precast Concrete Federation	<a href="http://www.britishprecast.org">www.britishprecast.org</a>

## BIBM ASSOCIATE MEMBER

	European Engineered Construction Systems Association e.V.	<a href="http://www.ecs-association.com">www.ecs-association.com</a>
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