

Press release

Wednesday, 8 October 2014

BOUYGUES CONSTRUCTION REWARDS ITS EMPLOYEES' INNOVATIONS

On Monday, October 6, the Group's Chairman and Chief Executive Officer, Yves Gabriel, presented the prizes for the 5th Bouygues Construction Innovation Competition. The ceremony, which was held at the Group's head office, Challenger¹, formed part of Bouygues Construction's Campus Innovation, a major two-day event that brought together employees and more than 400 customers and partners and featured seven round table discussions and more than forty-five stands.

Yves Gabriel, Chairman and Chief Executive Officer of Bouygues Construction, commented: "The success of the Innovation Competition demonstrates the commitment of all our employees to our drive for innovation. This commitment is essential if we are to meet the challenges posed by the revolution that is under way in the construction sector, characterised at one and the same time by the rapid development of digital in our business processes and by the need to integrate the changing expectations of the users of our buildings and structures into our approach."



Held every two years, the Innovation Competition rewards the best inventions submitted by Group employees, both in France and in other countries, in all our businesses. The operation has met with growing success: almost 2,000 employees took part in the competition in 2014, double the number that took part in the very first competition back in 2006. A shortlist was compiled by a panel of acknowledged experts from both inside and outside Bouygues Construction, and was submitted by the R&D and Innovation Committee to a jury made up of members of the Group's General Management Committee. Out of a total of approximately 900 entries, 38 won prizes. Some new ideas have already been put into operation on construction sites, and information on all of them will be circulated throughout the whole Group.

The following innovations were among the prizewinning projects:

- **First prize for Technology: hybrid TBM and multi-diameter TBM**

The hybrid tunnel-boring machine (TBM) is a mix between earth pressure and mud pressure types of TBM, which allows it to adapt to a wide variety of ground types along the drilling path. The multi-diameter TBM can dig tunnels whose section varies.

- **First prize for Works – Operations – Services: Bouygues modular construction**

This is a new type of precast module highly suited to certain types of housing (student bedrooms, hotel rooms, etc.), allowing modular construction. It will mean reduced costs and delivery times and increased quality of the finished product, while creating better working conditions on the construction site.

- **First prize for Construction Sites: the all-purpose hammer**

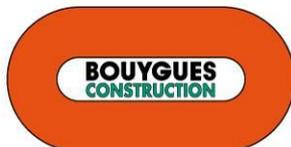
This unusually shaped hammer allows precise working in nooks and crannies that are difficult to reach using a traditional hammer. It is also safer and easier to use.

- **First prize for Sales: geomarketing of local authorities' needs for amenities**

This prize rewarded two geomarketing initiatives enabling the interactive visualisation of a local authority's amenity needs (street lighting, fibre optics, swimming pools, etc.) and generates presentations for the customer.

¹ A renovated positive-energy building, Challenger is the world's first building with triple LEED®, HQE® and BREEAM® certification.

Acteur global de la construction et des services, Bouygues Construction conçoit, réalise et exploite des ouvrages qui améliorent au quotidien le cadre de vie et de travail : bâtiments publics et privés, infrastructures de transport, réseaux d'énergie et de communication. Leaders de la construction durable, le Groupe et ses 52 200 collaborateurs s'engagent ainsi sur le long terme auprès de leurs clients pour les aider à bâtir une vie meilleure. En 2013, Bouygues Construction a réalisé un chiffre d'affaires de 11,1 milliards d'euros.



Shaping a Better Life

- **First prize for Logistics – Purchasing: Connecting sleeves and tubes in situ**

This connecting sleeve for high-density polyethylene (HDPE) tubes is intended for the world's longest buried 225 kVA power line. It is produced in a mini-plant temporarily installed on the site. In addition to direct benefits in terms of manufacture, transport and implementation, it also reduces the environmental impact of the construction site (CO₂, pollution).

- **First Prize for Equipment: Pre-magnetised formers and butts, rigid frame formers**

These are two innovative developments for producing formers used in construction. In the first innovation, traditional materials (generally timber) are replaced by aluminium, which is very lightweight and can easily be reused from one site to another. In addition, this new type of former is very ergonomic thanks to integrated pre-fixing which makes it much easier to install in the formwork. The second innovation is intended to resolve the recurrent problems encountered when installing door- and window-frames and pouring concrete onto them.

- **First prize for Management – Accounting – Finance – Legal – Administrative: Logiskey**

This is a system for checking personnel on a construction site based on the use of tablets or smartphones that scan cards with QR codes. The use of "smart glasses" is also being considered.

- **First prize for Human Resources – Communications: Energy Hack**

The aim of this Hackathon (a collaborative computer programming challenge) was to develop prototypes of innovative applications based on controlling energy demands and the uses of energy in apartments, in two days.

In addition, several special awards were presented this year:

- **Special Jury Award: the Bouygues Travaux Publics tunnels initiative**, which made it possible to employ modern and innovative tools to improve the ergonomics and productivity of TBMs.
- **Special Award for Health & Safety: the D'colpano**, a tool for striking formwork on construction sites without using traditional methods, such as crowbars and pry bars. It makes it possible to strike formwork without damaging the concrete or the forms, in complete safety.
- **Special Award for Ergonomics: the B07 decompression box**, which makes it easier to remove rods between formwork and tightening nuts with no great effort, an improvement in terms of productivity and ergonomics.
- **Special Award for Sustainable Development: "21 proposals for the third industrial revolution"**. In the context of the Master Plan for the Third Industrial Revolution, 21 proposals for actions were elaborated and organised according to four main themes: spreading current know-how more widely, launching the third industrial revolution through demonstrators showcasing innovations, combating the urgency of social insecurity and energy poverty, and developing our models in the light of lateral power.
- **Special Award for Partnerships: ECO'nergy digger**, a new system, jointly designed with an equipment supplier, that improves the performance of the mechanical arms of diggers and reduces their energy consumption. The device recovers hydraulic energy released by the lowering of the arm of the digger and then reuses it to lift the arm, thereby relieving the load on the engine.

For several years now, the Group has been committed to a dynamic approach to innovation with a view to inventing the city of tomorrow alongside its partners, seeking to provide all its stakeholders with sustainable solutions, whether societal or technical.

Each year, Bouygues Construction devotes half of its R&D and innovation budget to sustainable construction, to design new uses, improve the performance of materials and equipment, guarantee safety, optimise construction times, and reduce environmental impact.

The Group is in no doubt that digital modelling is the future and that it represents a major source of progress. It has also undertaken a process of modernising its businesses to meet the new challenges of construction, in which BIM (Building Information Modelling) is playing a key part in the shift to more industrial construction methods, allowing us to significantly reduce lead times and costs, which will be in everyone's interest.

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Akteur global de la construction et des services, Bouygues Construction conçoit, réalise et exploite des ouvrages qui améliorent au quotidien le cadre de vie et de travail : bâtiments publics et privés, infrastructures de transport, réseaux d'énergie et de communication. Leaders de la construction durable, le Groupe et ses 52 200 collaborateurs s'engagent ainsi sur le long terme auprès de leurs clients pour les aider à bâtir une vie meilleure. En 2013, Bouygues Construction a réalisé un chiffre d'affaires de 11,1 milliards d'euros.



Shaping a Better Life



**CAMPUS
INNOVATION**
••••• 2014

Press Kit

The First Innovation Campus by Bouygues Construction

7 October 2014



**BOUYGUES
CONSTRUCTION**

Shaping a **Better Life**

Supporting innovation to promote sustainable construction for everyone

For several years, Bouygues Construction's research and innovation policy has been a decisive driver in terms of competitiveness and differentiation that has enabled the Group to anticipate and keep pace with all the changes that are impacting its businesses. For this reason, investment in R&D has grown by a factor of 2.7 since 2006.

As new uses develop, Bouygues Construction must imagine its projects differently. The Group is always on the lookout for emerging trends and places customers and users at the heart of its projects by working together with the academic world, manufacturers, associations, elected officials and decision makers.

As a response to the environmental challenges raised by its activities and a source of growth for the company, sustainable construction is central to the research programmes of Bouygues Construction. The Group devoted 51% of its R&D investment to sustainable construction in 2013, compared with 34% in 2009. It has also put the issue at the heart of its strategy, launching a sustainable construction project in 2010 within the framework of Actitudes, its in-house sustainable development policy. Over and above the technological implications, the project concerns organisation, marketing and sales and worksite production methods. The aims are to develop innovative and practical solutions at every level of the company that promote sustainable construction.

> Performance Leverage

The aim of Bouygues Construction's R&D approach is to find solutions that are suited to new uses. By creating value for its customers, Bouygues Construction also seeks to improve its own performance, thinking today about the solutions that will be the references of tomorrow.

This means asking ourselves far in advance about how future users will use the building or public facility, how they will appropriate it for themselves, and how they will share it with others.

For public facilities, for example, beyond uses specified by customers, future users must truly be able to appropriate the project for themselves, settle in, work there, and enjoy themselves.

Thinking about the needs of users is also important for the housing of the future. Family structures have changed, the need for social contact is growing ever greater, and household incomes are increasingly constrained. In addition to the energy performance needs of structures, new needs and services are emerging, such as improving the level of comfort, reducing costs and charges, making spaces more modular, and proposing soft mobility solutions and local services.

Bouygues Construction organises its innovation capabilities around two main areas:

- Delivering the projects faster, at the lowest cost, and in the safest conditions. To do so, the Group mainly works on improving its materials, tools, and construction process.
- Developing sustainable construction by seeking to limit our environmental impact, bring more comfort to users, and find more energy-efficient solutions.

> A Culture of Innovation

From design to operations, from sales to the project site, innovation is everywhere and promoted at every step of our projects. Led by our Sustainable Construction and Innovation Department, innovation is at work in all of our businesses, whether it be real estate development, legal and financial engineering, eco-design, construction, maintenance or user services.

A committee in charge

Bouygues Construction's R&D committee concentrates its research on future solutions that will optimise production processes and improve the performance of constructions through innovations such as 3D modelling, next-generation insulating cement and robot drillers. This committee is a true catalyst of the Group's talents, choosing priority work themes, forming teams around these projects, giving them the necessary resources, and setting clear delivery dates for them. The committee also determines which managers will be in charge of developing innovation around the set themes. Currently our research efforts focus on two main areas: sustainable construction and the strategic approaches of each of our different business areas.



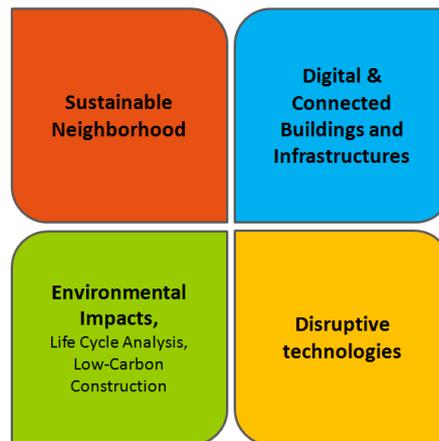
A constant concern

Innovation is supported and deployed by all our employees. Whatever their place may be within the Group, they commit individually and collectively to finding ways to continually make construction more sustainable and efficient. As a testament to their involvement: during the 2014 Bouygues Construction Innovation Competition, nearly 900 entries were submitted by almost 2,000 employees from all business lines and countries.

> An Increasingly Sound Partnership Approach with Open Innovation

To meet the challenges of sustainable construction, Bouygues Construction is pursuing open innovation: the Group innovates with partners that have complementary expertise and increases opportunities for contact with stakeholders such as manufacturers, OEMs, power companies, industrialists, universities, and so on – all with the aim of finding lasting solutions together. In concrete terms, the R&D development of our projects is carried out by a team made up of employees and internal experts, as well as our partners in industry, universities, SMEs, and start-ups. The goal of these partnerships is to constantly improve the intrinsic performance of the materials Bouygues Construction use and the techniques it implements.

Four overarching open innovation themes were defined for 2015:



Strong ties with our partners in industry

Because the performance of our buildings and infrastructures depends largely on the quality of the materials that Bouygues Construction uses to build them, the large companies and SMEs that produce these materials and invent new ones are valuable allies. The Group has been working alongside some of these manufacturers for several years in our search for efficient solutions. For example, Lafarge, partner of Bouygues Construction for nearly a decade, has helped the Group design insulating concretes such as Thermedia 0.6. Bouygues Construction has worked with Renault and Nissan to reuse batteries from electrical vehicles to store energy in buildings. The Group has also helped Techniwood develop a new generation of prefabricated wood panels that provide a very high level of thermal performance.

Dialogue with academic organisations and civil society

Bouygues Construction is developing close relationships based on sharing knowledge and forward-looking thinking with the scientific, educational, and academic communities. In conjunction with the École des Ponts ParisTech, the École Centrale Paris, Supélec and the French Scientific and Technical Centre for Building (CSTB), the Group sets up a research and teaching chair in "Sustainable Building and Innovation" in 2010.

Bouygues Construction's Sustainable Construction Club brings together customers, partners, and employees for discussions around forecasting market evolutions and ways to develop what the Group offers. As an extension of this work, in 2013 Bouygues Construction launched two think tanks devoted to more specific themes, one on the question of leisure time in the city, the other on new ways of living in social housing.

2014, the Year of Partnership Innovation at Bouygues Construction



Bouygues Construction was an active participant in Solar Decathlon Europe, one of the largest international university competitions for sustainable housing. This event was held at the National Estate of Versailles. Twenty teams competed, made up of 600 students and 200 professors from 41 prestigious schools and universities, from 16 different countries. Their challenge was to design and produce functional, full-scale housing using the sun as the main energy source. The Group sponsored the Thai team's "Adaptive House" project.

Another major event this year was the development of the Bouygues Construction Innovation campus at Challenger, the Group's head office. Organized around the Innovation Contest's award ceremony, this campus is an opportunity to make a strong statement on sustainable innovation to our employees, customers, and partners.

The Group also joined Universcience and several companies and universities to develop the Callisto-sari room in the Cité des Sciences et de l'Industrie, the first immersive virtual reality room in the construction sector. It can be used to simulate an interior visit of a building at full scale, in real time, and perfect rendering. Following the success of this initial experience, Bouygues Construction is planning to create other immersive rooms at a smaller scale, including one at Challenger.



Finally, the 2014 Bouygues Construction Challenge, the Group's 18th annual student competition, invites teams to innovate. This year, participants are asked to propose an overall neighbourhood plan that focuses on innovation and new information and communication technologies. They will design an eco-connected and civic neighbourhood to meet the request of a local authority that wants to improve its attractiveness to citizens, businesses, and shopkeepers.

Bouygues Construction Innovation Competition

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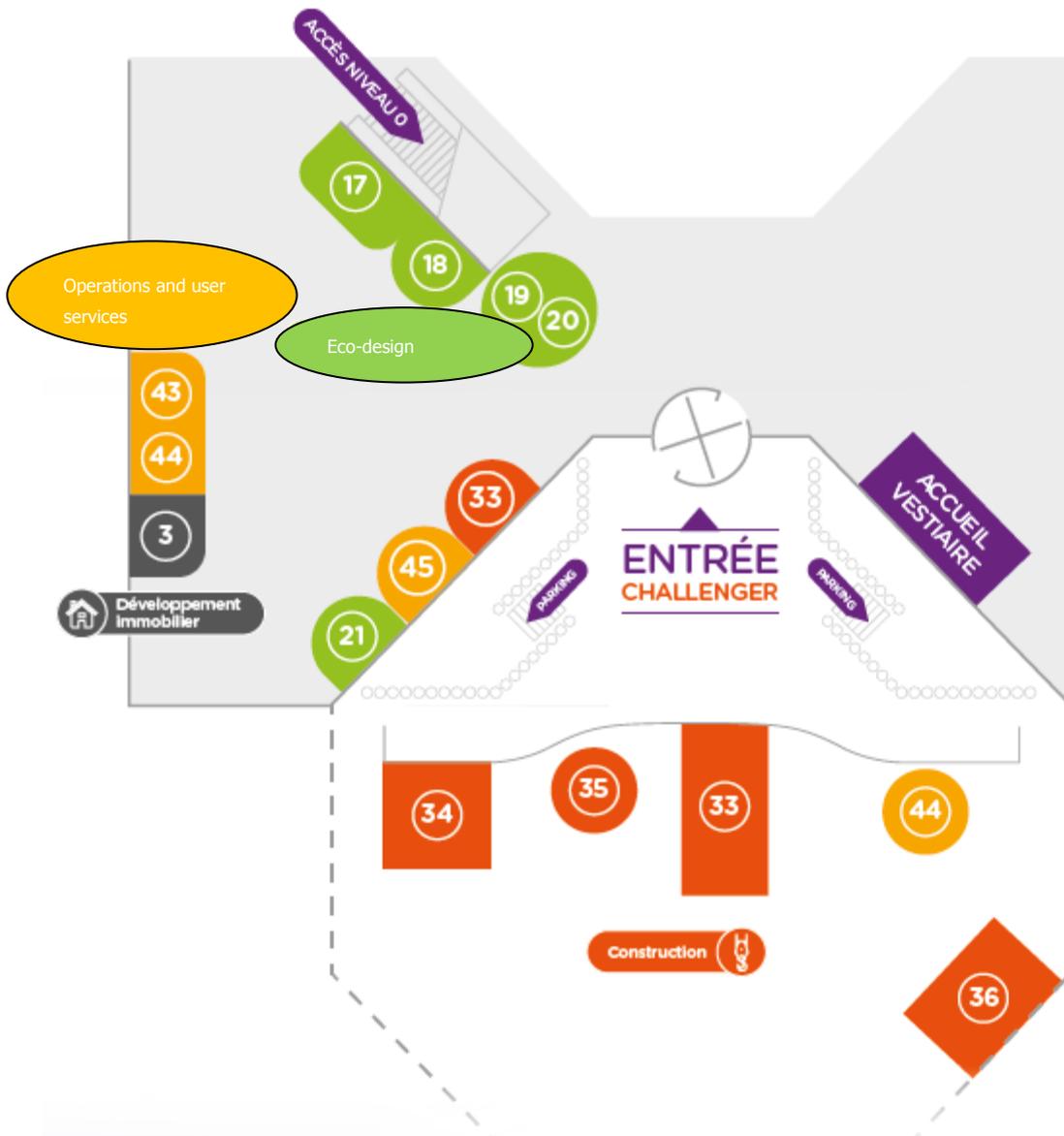
See the press release in the appendix for more details.



Bouygues Construction Innovation Campus

The Innovation Campus, which took place on 6 and 7 October at Challenger (the Bouygues Construction head office), showcases innovations developed by Bouygues Construction and its partners. Over two days this major event brought together employees and more than 400 customers and partners and featured seven round table discussions and more than forty-five stands.

Map of exhibition – level 1



Real estate development

- 1 Oxyterre
- 2 Natural resources economics
- 3 Innov'Asia

Legal and financial engineering

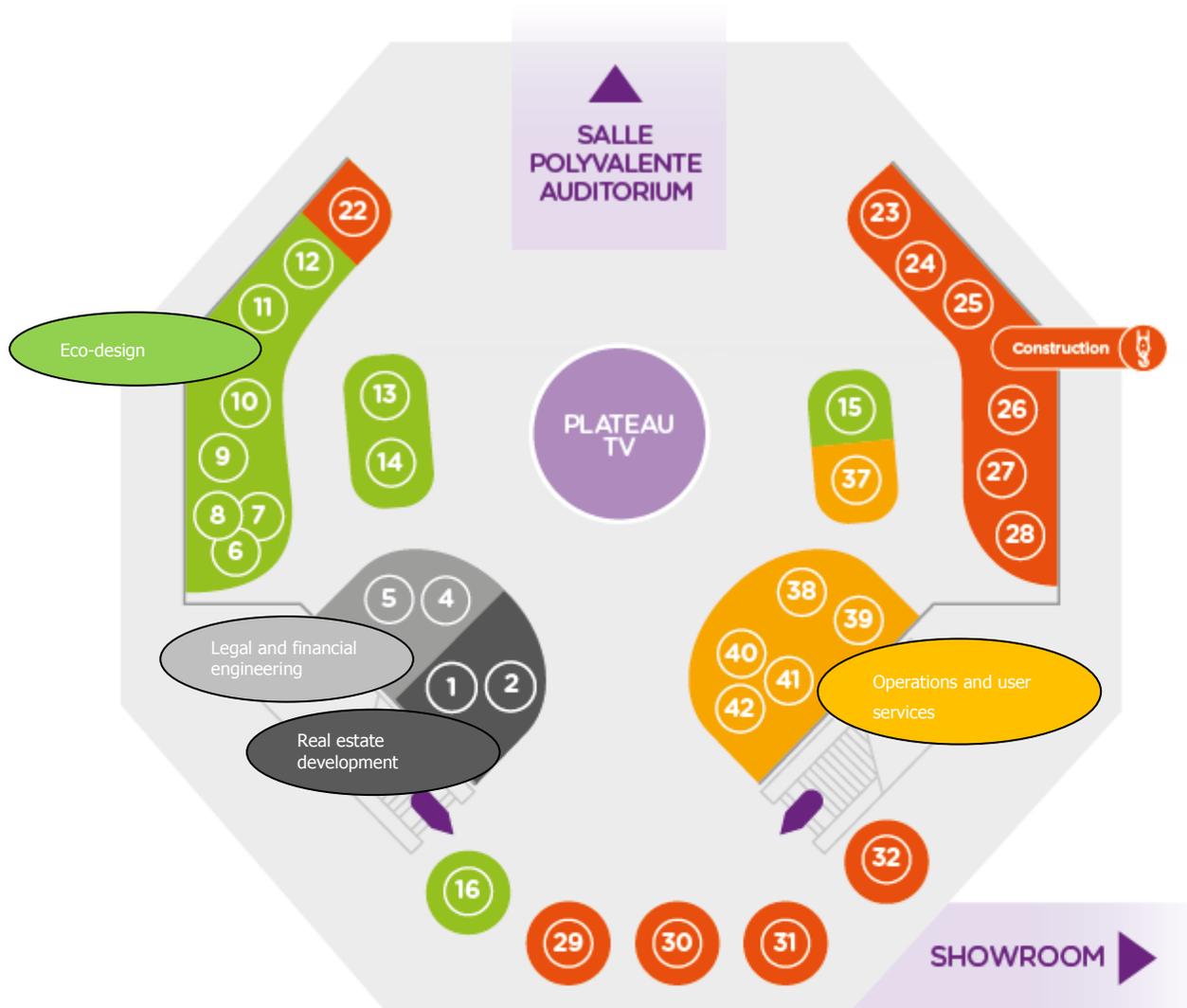
- 4 Financial engineering
- 5 New legal approaches

Eco-design

- 6 Thermedia - Ductal
- 7 Thermal comfort - PCM
- 8 DCBC
- 9 Mix3B
- 10 Techniwood
- 11 Challenger's Green Approach
- 12 Noé Conservation

13 BiodiverCity

- 14 Biositiv
- 15 DualSun
- 16 Innov'action
- 17 Batteries for Building (B4B)
- 18 ABC, the building concept
- 19 Eikenott - Greencity Zurich
- 20 MBC - ALIS
- 21 PAC Facteur 7®



Construction

- 22 Inovpac
- 23 Distrimo
- 24 EasyDriver
- 25 Oscar, the 2.0 hardhat
- 26 BASF
- 27 Isopac
- 28 ECO'nergy
- 29 Machine operation simulators
- 30 Construction 2.0
- 31 Construction 2.0 - steel reinforcement
- 32 Ramby
- 33 Jet-Snake
- 34 Roby
- 35 Mechanized roller cutter
- 36 Groundbreaking

Operations and user services

- 37 Ecosite worksite
- 38 Hypervision®
- 39 Connected housing
- 40 Sustainable Construction Club
- 41 Saint-Gobain
- 42 Office user value
- 43 Citybox®
- 44 Alizé
- 45 Drone

Innovations from Bouygues Construction to explore

ABC



ABC, the Bouygues Construction building concept

Concentrated in innovations, the ABC (Autonomous Building for Citizens) building aims to be self-sufficient in water and energy, and seeks to optimize waste disposal. The project is also designed to meet the needs of citizens.

The "Bouygues Construction city" in augmented reality

Augmented reality makes it possible to enhance reality by superimposing synthesized data and/or images using a digital device (tablet, smartphone, next-generation glasses, etc.). The scale model of the city developed by Bouygues Construction in 2013 incorporates the Group's solutions in sustainable construction, energy performance optimisation and infrastructure management.

A life-size demonstration of the "Jet-Snake"

The "Jet-Snake" is an inspection and cleaning system for the cutter heads of tunnel boring machines that makes it possible to check all the roller cutters. It is a multi-jointed arm that can be inserted into a 180-mm orifice to penetrate

the compressed air working space. It will be employed, for example, on the undersea tunnel project linking Tuen Mun and Chep Lak Kok in Hong Kong.

EasyDriver: the crane of the future

Several innovations are being developed for tower cranes to help with their operation. For example, the predictive anemometer can anticipate the risk of wind gusts and stop the crane in time. A GPS system will also enable the crane to geolocate a load.

Machine operation simulators

Used in France and around the world to test potential employees, they make it possible to assess skills and teach machine operating fundamentals to beginners.

Drones

Bouygues Energies & Services, a subsidiary of Bouygues Construction, gives its customers access to drones to assist them in capturing and analysing aerial images. Drones are particularly useful for technical inspection, worksite monitoring and field surveys.



Innovations from Bouygues Construction's Partners



The Colas connected hardhat

Colas Rail, a subsidiary of the Bouygues Group, imagined, designed and developed a next-generation construction hardhat called Oscar. It is equipped with a hands-free communication system with 10 hours of talk time, a system that remotely detects the presence of alternative current and an LED lighting system for tunnel work.

Hybrid solar panels from DualSun

These solar panels developed by the start-up DualSun with support from Bouygues Construction simultaneously supply both electricity (photovoltaic energy) and hot water (thermal energy). Their unprecedented yield makes it possible to produce two to four times more energy than standard photovoltaic panels. When it renovated its head offices at Challenger, Bouygues Construction installed 180 DualSun panels (300 m²).

Techniwood: a different approach to eco-construction

Launched in 2010, the partnership between Bouygues Construction and Techniwood led to the development of a new generation of industrial, high-performance "wood-insulator" composite panels called Panobloc[®] that will be used in construction and building renovation. This highly innovative project, which has secured nine patents, is a 100% French product and a world first in industrial prefabricated panels.

By giving it access to pilot worksites, such as the urban renewal project in the Pays de France neighbourhood in Reims and the Eikenott eco-neighbourhood project in Gland, Switzerland, Bouygues Construction has supported Techniwood in designing the Panobloc[®] solutions and in receiving technical opinions in France (from the CSTB, the Scientific and Technical Centre for Construction) and in Switzerland.

BASF: formalisation of a partnership with Bouygues Construction

BASF develops innovative solutions that promote sustainable construction:



- next-generation polymers designed to control viscosity in concretes
- encapsulation technology to speed up cementitious mixtures
- high-performance lightened waterproofing membranes
- insulation solutions that improve the air tightness and soundproofing of buildings
- coatings and equipment for urban development

During the Innovation Campus, Bouygues Construction and BASF signed a comprehensive partnership to:

- work together to develop innovative services and products which respect the environment
- design the sustainable buildings and neighbourhoods of tomorrow
- test the materials of the future
- reinforce both groups' technical expertise

See the press release in the appendix for more details.

Saint-Gobain: innovative comfort solutions

A highlight from Saint-Gobain will be its SageGlass electrochromic glass which transitions between clear and tinted states while retaining its transparency.

Furthermore, Bouygues Construction and Saint-Gobain have forged a partnership to work together on:

- interior air quality
- visual comfort and natural lighting
- worksite logistics and waste recovery
- an acoustic membrane
- prefabricated facades
- renovation of light facades
- developing a new concept for light interior partitions

Eco2charge with Renault and Bouygues Energies & Services: anytime access to energy

The goal of the Eco2charge programme, coordinated by Bouygues Energies & Services (a subsidiary of Bouygues Construction), is to speed up the deployment of electric vehicle charging stations in buildings, on campuses and in eco-neighbourhoods by the end of 2016. It harnesses the expertise of eight partners in different sectors to develop electric transport solutions: Actility, Alstom, Bouygues Energies & Services, CEA, EMBIX, Nexans, Renault and the University of Versailles Saint-Quentin-en-Yvelines.

These electric vehicle charging facilities will complement road infrastructures and enable users to recharge their electric-powered vehicles at their workplace, in their neighbourhood or at public or private charging stations (train stations, supermarkets, public car parks, etc.).

The aim of the Eco2charge project is to develop and market the solution's components within three years. The project, whose budget is 13.2 million euros, is being carried out with support from the PIA (France's Programme for Future Investments) as part of the Vehicle of the Future programme operated by ADEME on behalf of the French government.

linkcity, the New Sustainable Neighbourhood Initiative from Bouygues Construction



With its linkcity initiative, Bouygues Construction is leveraging its experience as a global player in construction and services to assist local governments with their sustainable neighbourhood projects.

Designed as eco-systems, these sustainable neighbourhoods must fulfil myriad needs: lodging, work, production, entertainment, etc. They must become increasingly efficient in their use of resources (energy, water, etc.) and create a better quality of life. Finally, they

must be more complex and engaging over the long term, which means that planning must unite all stakeholders behind shared objectives and coordinate their efforts.

Bouygues Construction is drawing on its experience developing other sustainable neighbourhoods like La Mare Huguet in Rosny-sous-Bois (93) and IssyGrid in Issy-les-Moulineaux (92).

For more information on linkcity, see the portfolio in the appendix to the press kit.



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As a global player in construction and services, Bouygues Construction designs, builds and operates buildings and structures which improve the quality of people's living and working environment: public and private buildings, transport infrastructures and energy and communications networks. A leader in sustainable construction, the Group and its 52,200 employees have a long-term commitment to helping their customers shape a better life. In 2013, Bouygues Construction's turnover was 11.1 billion euros.

