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THE ITALIAN PAVILION AT EXPO DUBAI 2020 FEATURES A MULTIMEDIA FAÇADE MADE WITH TWO MILLION RECYCLED PLASTIC BOTTLES

CRA-CARLO RATTI ASSOCIATI

SPECIAL PROJECTS / COMPLETED



CRA-Carlo Ratti Associati and Italo Rota Building Office, with Matteo Gatto and F&M Ingegneria designed the Italian Pavilion building at Expo 2020, a World Expo hosted by Dubai, in the United Arab Emirates, from 1 October 2021 to 31 March 2022. The project puts forward an all-encompassing vision for reconfigurable architecture and circular design. The multimedia façade is made with two million recycled plastic bottles, new types of building materials, and an advanced system for climate mitigation that constitutes an alternative to air conditioning. Reusing is also fundamental to how the structure was conceived. The pavilion utilizes three real-sized boat hulls, which could potentially set sail after the event, to create and shape the roof of the building. The Italian Pavilion was one of the best received pavilions at the Expo Dubai. When the event concluded after six months of exhibition, the Italian Pavilion exceeded 1.6 million visitors in attendance and 13 million online accesses from around the world. Its cutting-edge concept has also received extensive media coverage, and leading the pavilion to appear in several "must-see" lists. The Italian Pavilion envisions an architecture that challenges how buildings are usually developed for temporary events such as a World Expo, in which a lot of newly-built structures end up in the landfill after just a few months. Contrary to that approach, the Italian Pavilion was conceived as an architecture that is able to transform itself through time, in a sustainable fashion. The three boat hulls that form the pavilion's roof vary in length from 40 to 50 meters. They are supported by more than 150 slender vertical steel pillars, each 27 meters high. In turn, the hulls support a wave-shaped roof membrane made of ETFE pillows and a layer of perforated thin metal sheets that filter the sunlight. They are the three colors of the Italian flag - green, white, and red - and form what might be the biggest 'tricolor' in Italy's history (2100 square meters). The pavilion has no conventional walls. Instead, a curtain facade made of nautical rope, which also incorporates LEDs that can be lit to transform the facade into a multimedia surface, delineates the exhibition space. The nautical ropes are produced in recycled plastic, using the equivalent of roughly two million bottles, and form an intricate vertical meshwork that stretches almost 70 kilometers in length. The use of the nautical ropes and a localized cooling system integrated with misting allowed for extensive shading, natural ventilation, and better thermal comfort. The project showcased more

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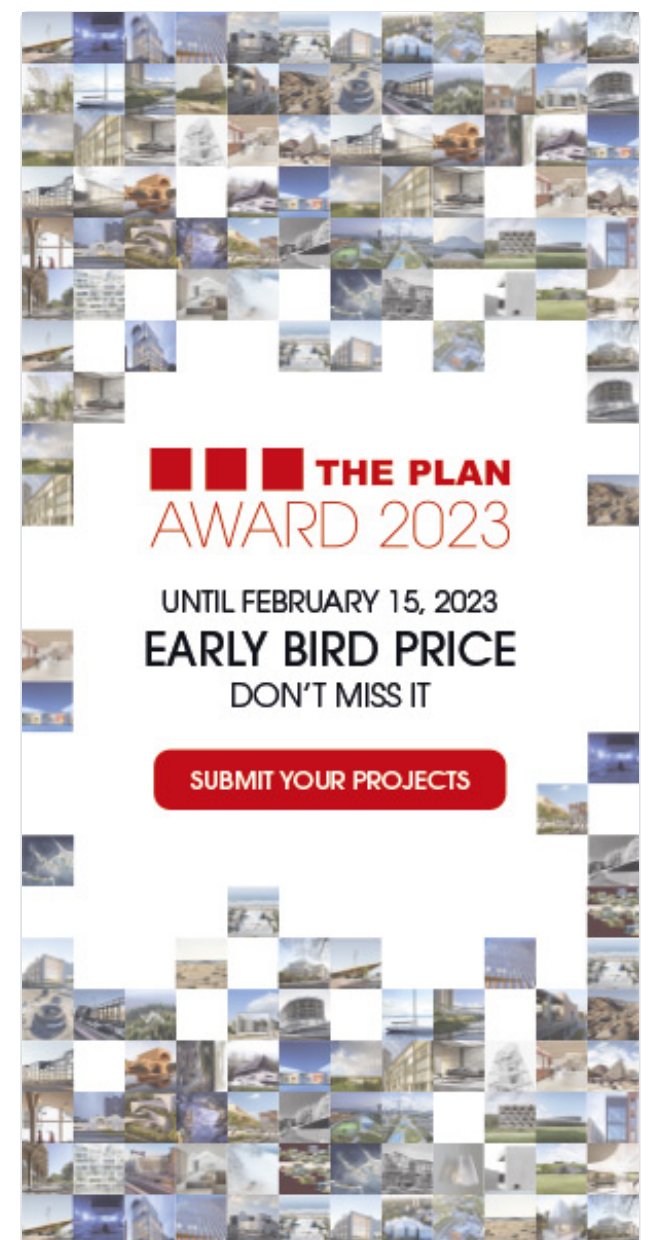
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sustainable ways to cool our buildings and cities in the future. Visitors entered the Italian pavilion's interior via an escalator that took them to a skywalk suspended 11 meters above the ground, just below the nave of the first hull. From this vantage point, they could overlook the entire pavilion from a catwalk floating above the exhibition spaces and installations. The rest of the Italian Pavilion also includes materials that were chosen in line with the circular approach, developed in collaboration with manufacturer of building materials Mapei. Coffee and orange peels, left to dry and reduced to powder, are used to coat the suspended pathways and walkways. The pavilion itself rests on a dune five meters above ground level, made out of locally sourced sand. Moreover, the path inside the Italian Pavilion is enriched by a series of green elements from more than 160 different species cultivated inside the building. Developed in collaboration with Italy's National Research Council (CNR) and botanist Flavio Pollano, this natural landscape pays tribute to the biodiversity and ecological beauty of the Italian and Mediterranean territories. Particular attention is given to the role that plants play in stopping desertification. Among the main spatial features are the Belvedere, a round structure topped by a dome, covered by wild herbs of the Mediterranean maquis, which evokes Renaissance gardens. Here, spirulina microalgae, cultivated by renewable energy company TOLO Green, enables the ecological treatment of air through the biofixation of the carbon dioxide emitted by visitors. The pavilion's ground floor features the "Solar Coffee Garden", a cafe designed by CRA and Italo Rota for leading coffee company Lavazza. CRA and Italo Rota also designed an installation for global energy company Eni, titled "Braiding the Future", which focuses on the biofixation of carbon dioxide. It recreates microalgae cultivation using a spectacular cascade of 20-meter-high technological liana vines. Within each of the luminescent lianas flow the microalgae: the see-through circuit becomes a spectacular interpretation of the production technology of these unicellular organisms, which produce high-value compounds through a natural photosynthesis process. The technology of intensified biofixation of carbon dioxide that inspired the installation was developed in Italy by Eni, Politecnico di Torino, and the start-up Photo B-Otic. It allows the intensive cultivation of microalgae through photobioreactors, lit through LED technology optimized on specific wavelengths. After the Expo ended, conversations have been made to assess the most appropriate treatment of the building and its components, following the logic of the circular economy.

Credits

City: Dubai

State: United Arab Emirates

Client: Confidential

Completion: 10/2021

Gross Floor Area: 3.500 mq

Architects: Carlo Ratti

Design team: CRA team: Carlo Ratti, Francesco Strocchio (Project manager), Monika Löve (Project manager), Luca Bussolino, Mario Daudo, Serena Giardina, Ina Sefgjini, Nicola Scaramuzza, Giovanni Trogu; CRA Graphic Team: Gary di Silvio, Pasquale Milieri, Gianluca Zimbardi; Past team members: Saverio Panata, Andrea Fasolo, Alberto Geuna, Gerolamo Gneccchi, Francesca Marino, Lucia Miglietta, Marco Maria Pedrazzo, Davide Ventura

Consultants: Matteo Gatto team: Matteo Gatto, Stefano Monaco, Barbara Corli, Valentina Rizzo / Past team members: Paolo del Toro, Edoardo Perani // F&M Ingegneria team: Sandro Favero, Federico Zaggia, Luigi Ranzato, Lorenzo Colarusso, Nicola Ros, Federico Moro, Antonio Nuzzo, Mauro Baessato, Davide Pizzolato, Dino Casagrande, Marco Furlanetto / Past team members: Francesca Favero, Luca De Antoni, Dhebora Gambaro, Francesco Mason, Alessandro Palamidese, Luca Sangiorgi, Paola Zisa, Mirco Zuin, Alessandro Bonaventura, Marco Bonaldo, Francesca Bertuzzo // Scenography design consultant: Alessandro Camera // Video and Multimedia Consultant: AGMultivision (Tiziano Alessandro Testoni) // Lighting Design Consultant: Luminae Lighting Design (Lorenzo Brusciaglioni) // Sound Design Consultant: P2A Design (Alessandro Pasini, Simone Fagnani, Paola Renda) // Wayfinding Consultant: 100km studio (Luigi Farrauto) // Graphic Consultant: studio FM milano // Landscape Consultant: CNR (Silvia

Fineschi, Roberto Reali, Francesco Carimi), GMP Studio (Flavio Pollano, Rachele Griffa)

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Curriculum

CRA-Carlo Ratti Associati is an international design and innovation practice based in Turin, Italy, and New York City. Drawing on Carlo Ratti’s research at the Massachusetts Institute of Technology (MIT), the office is currently involved in many projects – from furniture to urban planning. Among recent projects, there are the Italian Pavilion at Expo Dubai 2020, the CapitaSpring skyscraper in Singapore, the curatorship of the “Eyes of the City” at the 2019 Bi-City Biennale of Architecture and Urbanism of Shenzhen, the redesign of the Agnelli Foundation HQ in Turin, the masterplan for Milan Innovation District. CRA is the only design firm whose works have been featured three times in TIME Magazine’s “Best Inventions of the Year” list – respectively with the Digital Water Pavilion, the Copenhagen Wheel, and Scribit. In the last years, the office has been involved in the launch of Makr Shkr, a startup producing the world’s first robotic bar system, and Scribit, the write&erase robot.

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