



# THE GERMAN PAVILION AT EXPO 2020 IN DUBAI

## SUSTAINABILITY

Presented by



Federal Ministry  
for Economic Affairs  
and Energy

Organised by



koelnmesse

---

## THE BUILDING

### DESIGN, AIR CONDITIONING, ENERGY CONSUMPTION AND MATERIALS

**In what ways does the architecture attempt to take ecological aspects into account? How is sustainability being incorporated into the construction process? And what will happen to the pavilion after the Expo?**

#### **Lightweight construction and “grey energy”**

The architecture of the German Pavilion follows the German tradition of lightweight construction, which uses as few structures and materials and as low a building mass as possible to create as much usable space as possible. This has an extremely positive effect in terms of the energy required in the construction of the building. The “grey energy”, i.e. the energy needed to manufacture, transport, store and dispose of materials, is reduced to a minimum.

For instance, where possible, concrete and glass are not used in the pavilion’s façade since they are heavy materials that do not lend themselves easily to reuse. Instead, large parts of the façade are made of ETFE film, which means that very little material is required. Moreover, since used ETFE film can be cleaned and reused in the production of new film, it is practically 100% recyclable.

We also try to reduce the packaging materials used in logistics processes as well as optimising transport routes, weight and shipping methods to keep carbon emissions as low as possible and reduce grey energy even further.

---

## THE BUILDING

### DESIGN, AIR CONDITIONING, ENERGY CONSUMPTION AND MATERIALS

#### **Air conditioning and energy consumption**

Passive energy-saving measures played a key role right from the design and planning phase. As well as enclosing the vertical space of the atrium, the stacked exhibition units reduce the impact of direct sunlight, decreasing the heat load and optimising the indoor climate. In addition, the position of the sun and the use of natural shade were incorporated as part of the climate management system. Digital design processes were used to determine the ideal position for the different structures, taking into account the altitude of the sun throughout the course of a day and over the six months – without compromising the functional requirements for the building.

This intelligent creation of shade by the building elements themselves makes “hybrid” air conditioning possible. In this system, the lower parts of the façade will be opened during the winter months, enabling the atrium to be cooled via a natural chimney effect, thus saving energy that would otherwise be needed for air conditioning.

Moreover, this intelligent climate management system creates zones with different levels of air conditioning so that visitors are gradually cooled down as they move from one zone to the next. As a result, the German Pavilion will be quite “warm” compared to usual buildings in Dubai but there will not be any impact on visitor comfort. This too will also save energy.

---

## THE BUILDING

### DESIGN, AIR CONDITIONING, ENERGY CONSUMPTION AND MATERIALS

#### **Materials**

Every effort is made to avoid mixing materials as far as possible so that they can simply be recycled or reused later. The focus here is on reusable materials such as steel. The architects at LAVA had already taken this aspect into consideration in their planning. Their innovative approach is to see building parts as “snapshots” in the materials’ lives and the pavilion as a sort of “warehouse”. For example, the roof of the German Pavilion, which has a frame that seems extremely complex at first glance, consists of numerous structures combined in an intelligent manner. It will serve as a supporting structure for six months and can then be reused elsewhere in a different form. For this purpose, specialists in data utilisation in architecture have developed an approach known as “Mine the Scrap”, which uses digital methods to calculate the best way to reassemble existing elements. Visitors will also find an exhibit on this topic on the Future City Terrace.

#### **Reuse of the building**

The Expo regulations stipulate that the plot has to be returned to the organisers no later than six months after the end of the World Expo – in the condition in which we received it. In other words, we have to dismantle everything that is erected on it.

It is for this reason that the pavilion has been designed as a temporary building to cope with large visitor numbers for the six months of the Expo. It has been built using lightweight construction methods and meets the needs of an Expo presence, with very special rooms and areas such as the exhibition itself, restaurant, office wing and the VIP lounge. Any form of reuse after the expo would require extensive conversion and upgrading. In our experience, it can be assumed that this would require more energy and resources than to construct a new building.

---

## INTERIOR AND EXHIBITION

**What about the inside of the pavilion? Have efforts been made to ensure it meets ecological requirements too? For example, in terms of furniture, floor coverings and interior finishing materials?**

### **Materials**

Efforts have also been made in the interior finishing work to ensure sustainable materials are used as far as possible. When choosing manufacturers, an important criterion for us was that they already had a sustainability report based on the Global Reporting Initiative (GRI) standard, the EMAS environmental statement or a similar document, showing a clear commitment to environmental protection.

Specific examples include:

- Our partner SEDUS **optimises the metal parts and fabrics used in their furniture**, cutting them to size in a way that minimises waste. No solvents are used in the powder-coating and upholstery-adhesion processes and the product packaging is “as much as necessary, as little as possible”. There are also life cycle assessments for each SEDUS product, enabling product-specific environmental balance sheets to be drawn up, taking into account all environmental impacts during the procurement of raw materials, manufacture, use phase and disposal.
- The **carpet** to be used in the pavilion also comes with an environmental protection certificate. The Indoor Air Comfort Gold label is a certification mark that helps achieve major ecological and health-related improvements by ensuring compliance with strict requirements concerning emissions from construction products. The criteria for the awarding of the label are developed in collaboration with independent bodies and the awarding process itself is transparent. Comprehensive inspections take place regularly.
- All the **timber** used in the building is Forest Stewardship Council (FSC®) certified. The FSC is an international organisation that promotes environmentally friendly forestry practice – in other words, forest management that leads by example.
- We also have similar certificates for **paints, floor coverings and other materials**.

---

## INTERIOR AND EXHIBITION

In addition, we have attempted to use innovative sustainable materials from Germany. (However, this was only possible to a limited extent because all materials used in Dubai have to be certified and new materials do not always have certificates.)

Specific examples include:

- The **material in the exhibition furniture** to be used on the Future City Terrace is made of recycled waste from the insulation industry, for example, from refrigerator production. It is 100% recyclable, formaldehyde-free and does not emit physiologically relevant amounts of chemical substances – a true example of upcycling.
- The **seat cushions in the restaurant** are made of a new man-made material developed by our partner Covestro. Instead of using carbon from crude oil, natural gas or coal, this new material is based on carbon from carbon dioxide molecules. In other words, the carbon dioxide produced, processed and emitted by power stations, transport systems and industrial facilities. This new innovation protects fossil resources and uses part of the emitted carbon dioxide for industrial production.
- For the **plastic balls in the Germany by Numbers room**, we went to a lot of effort to identify a manufacturer that could supply balls made from recycled plastic. After the Expo, they will be given away to local nurseries and schools.

---

# INTERIOR AND EXHIBITION

## **Multimedia equipment**

All the pavilion's multimedia equipment has been leased for the project and will be fully reused afterwards. In addition, we will be using energy-saving lighting with LED bulbs. These have a high light output and long service life. They require around 80% less energy than conventional bulbs. So we will be using environmentally friendly, energy-efficient technology to make the German Pavilion "shine".

The IAMU system we have developed for the Expo will deliver a surprising visitor experience. Guests will make their way through a smart pavilion, which interacts with them directly. Here too, we have taken a sustainable approach, opting for rechargeable batteries, an idea specially developed at our suggestion.

## **Reuse of the exhibition**

Since many of the exhibits have been developed with partners who will continue to use them after the Expo, most of them will be shipped back to Germany for reuse afterwards. We are still looking for ways to reuse the remaining exhibits and would be happy to hear from anyone interested.

---

## TOPIC OF THE EXHIBITION AND GERMAN PAVILION PARTNERS

**Germany decided to build its pavilion in the Sustainability district of the EXPO site. But how much sustainability will there be in the German Pavilion exhibition?**

### **Topic of the exhibition**

The exhibition will be a “curated” call for sustainability. With its powerful informative and emotion-stirring concept, it will make a strong case for a more sustainable future and spotlight innovations and solutions “made in Germany” that could help turn that better future into reality.

Our exhibition at the Expo will have lots for children too. With plenty of opportunities for “learning by doing”, the exhibits will provide a fun way of raising young people’s awareness today of how their actions will impact tomorrow.

An estimated 3 million people from across the globe will visit the German Pavilion during the Expo and numerous representatives of the press and the political sphere are expected too. Our exhibition aims to show them that everyone can help promote sustainability if the right technological, economic and social strategies are put into place. All these people will gain a detailed impression of the level of innovation already displayed in sustainable solutions from various different areas today and what opportunities they offer us for the future. And what’s more, they will take those impressions away with them out into the global community.

---

# TOPIC OF THE EXHIBITION AND GERMAN PAVILION PARTNERS

## German Pavilion partners

Some 20 research centres, universities and businesses have partnered with the German Pavilion to showcase innovations for a sustainable future.

Examples include:

### ENERGY LAB

- One of the exhibits in the Energy Lab will demonstrate how **energy can be generated from ocean waves**. Wave power plants work on the basis of an innovative principle that enables them to harness the energy of wave movements in an efficient, long-lasting and cost-effective manner.
- Another exhibit features a particularly sustainable and efficient solution for **storing energy using limestone** – a solution that enables the energy to be stored for a long time and uses inexpensive, long-lasting raw materials.

### FUTURE CITY LAB

- Among the items on show will be a **new type of elevator**, bringing unlimited height, horizontal travel and smart control – a revolution for the planning of tomorrow's buildings and towns and cities.
- Another exhibit will focus on the work done by researchers to develop **bacteria** that absorb plastic from fossil resources and upcycle it to make reusable, compostable bioplastic.

### BIODIVERSITY LAB

- The research showcased here will highlight the **value of nature**. The shift in how business sees these “natural services” is revolutionary with companies realising that protecting nature is often cheaper than any technical solution.
- Visitors will also be able to see “EcoUnits”, which enable **ecosystems to be studied under laboratory conditions**. With their help, scientists can – for the first time – understand the highly complex interdependencies between systems, such as the devastating impact of European earthworms on North America's ecosystems.

---

## OPERATIONS DURING THE EXPO

**What about during the actual Expo? For example, the people visiting the German Pavilion every day will produce a lot of waste. Are there any ideas about how to deal with that?**

### **Resources**

The “Expo 2020 RISE Guidelines for Sustainable Operations”, which apply to all participating countries, specify a target of 85% (by weight) of waste to be recycled and thus diverted from landfill. They also include requirements concerning reduction of greenhouse gas emissions, water consumption and pollution and promotion of sustainable procurement of materials such as paper.

### **Restaurant**

We have planned a range of measures to avoid and reduce waste in our restaurant. We will not be using disposable plastic products such as plates, cups or straws. Food will be prepared on site and we aim to source ingredients locally as far as possible. In addition, some of the food that will be delivered to Expo 2020 will be certified to a recognised organic standard.

### **Staff**

All German Pavilion staff will be given monthly metro passes and thus use public transport for their commute.

Moreover, in order to avoid constant staffing changes and unnecessary flights, we are only recruiting applicants who are willing to work for us for the duration of the Expo.

---

# EXPO 2020 DUBAI AS A WHOLE

**How is the Expo as a whole dealing with sustainability? After all, there are over 190 participating countries and 25 million visits are expected. What are Expo 2020's main objectives with regard to sustainability?**

Obviously, a large-scale event can never be completely environmentally friendly. The important thing is to show the millions of international visitors what will be possible in the future in terms of ecological solutions. Having said that, Expo 2020 Dubai aims to be one of the most sustainable world expos ever and publishes an annual sustainability report to reinforce this commitment. This sustainability message will last beyond the six months of the Expo, inspiring millions of visitors to take action to protect the environment.

The Expo has defined four key goals designed to make a positive contribution to the environment at the national, regional and global level:

- Leave a legacy of sustainable infrastructure and cutting-edge sustainability practices
- Catalyse sustainability efforts in Dubai and the UAE
- Increase public awareness and engage society about sustainability principles and sustainable living
- Develop sustainability solutions that are scalable, extending benefits to the wider economy

Expo 2020 aims to achieve its sustainability goals using a variety of innovative solutions:

- Generating clean energy
- Reducing water consumption
- Promoting natural solutions
- Minimising our carbon footprint
- Using sustainable building materials
- Reducing waste
- Encouraging sustainable tourism