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StationGreen


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Horern

StationGreen in Kerpen-Horrem

Foreword.

Dear reader,

StationGreen in Kerpen-Horrem opened its doors in summer 2014. As Europe's first climate-neutral station, it is also the blueprint for further projects in this innovative programme. On the following pages, you can find out more about our ideas for sustainable and customer-friendly stations. We hope you will be impressed and inspired by our vision of an infrastructure fit for the future. Developing the project, we asked ourselves: what will the station of the future look like? We were interested not only in developing the railways as an environmentally friendly system of mobility that conserves resources and minimises its CO2 emissions. We also wanted to focus on convenience and comfort for future passengers.

We designed the StationGreen so that the station takes advantage of natural resources such as solar energy using both solar cells and large facade windows. The transparent design helps passengers find their way around. A central, open-plan waiting area in the entrance hall provides a pleasant place to sit. We believe that envirenmental issues are directly connected to greater comfort and convinience.

The second stop on our project was StationGreen in Lutherstadt Wittenberg, which opened in 2016. In constructing resource-saving and energy-efficient station buildings, we are gathering valuable experience that we can also put to good use in renovating existing facilities. We are continuing to develop the StationGreen programme and looking for more trend-setting locations for the next StationGreens.

Maybe your station, too, will soon set an example of sustainable mobility.

Please do not hesitate to get in touch with us.

Yours faithfully,

Oliver Hasenkamp,
Director Object Development and Architectural Planning (I.SPO)

"Light and airy architecture, generous spaces with a feel-good factor, sustainable technologies and a completely new level of comfort for passengers."

Sven Hantel
Chief Production Officer
DB Station&Service

A Station Becomes an **Ambassador.**

It all began in 2009 under the working title **"Station of the Future"**. Today, our innovative project has become a working reality, yet one which has lost none of its visionary impetus. We, too, as a team of architects, have grown with the pilot project and the progress it has made. Our ultimate aim was to create a station building that combined the latest environmental standards with high levels of comfort and convenience for customers.

The result: Germany's first two **carbon-neutral** stations in Horrem (NRW) and Lutherstadt Wittenberg, which have been on track to the future since 2014 and 2016. StationGreen combines architectural transparency with a consistent environmental approach, intermodal function, digital facilities and barrier-free access. This makes it an ambassador for a new generation of stations.

For us as architects, making life easier for customers was just as important as the environmental aspects. The new station is not only a mobility hub, but an urban planning statement about customer-focused, **liveable urban design**. Something every town and city can be proud of.

"Light is quality of life – our guiding principle when designing stations."

Philipp Luy
Architect, DB Station&Service AG

Let There Be **Light.**

A station is always a meeting point. And that made it important for us to bring as much light into the building as possible. Light is life and StationGreen is all about natural light, from top to bottom. Standing in front of the building, visitors are transfixed by the expanse of **glass covering 52 percent of the facade**, which opens up the view inside. An additional light-reflecting fixture enables light to reach every part of the station all day long and provides an energy-saving blend of natural and artificial light.

Of course, we do more than just flood the station building with sunlight. During the winter months, we also use resource-saving solar energy to heat parts of the building. Another cornerstone of our lighting concept is the extremely **efficient artificial lighting system**. Its LED technology switches on as needed. Every part of the lighting architecture works together to produce a pleasant, open atmosphere with a high degree of visual comfort.

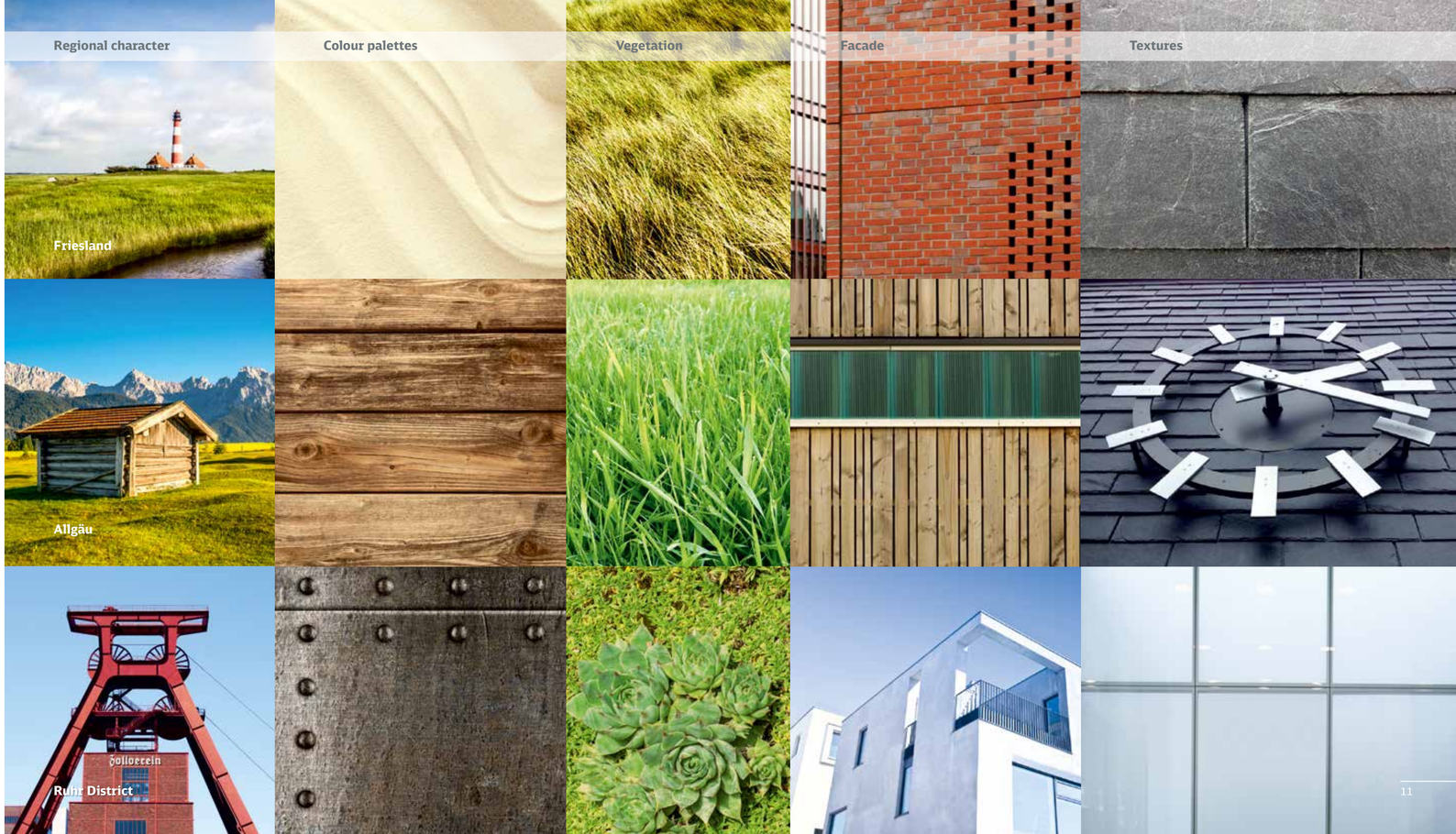
StationGreen Is Tailor-Made for **Its Location.**

We all grow with our challenges. But a station that can grow with its challenges, instead of reaching its limits, is something new. Thanks to the modular principle of StationGreen, we can adjust the size of each station to fit the needs of the town or city where it is located. The building's design is based on the goal of efficient standardisation.

What your station is made of.

A made-to-measure station was not enough for us. We also wanted to turn the facade into a bespoke piece of design that matches your town. The colour palette and visual impression of the materials are adaptable for every location. The common denominator: StationGreen uses materials drawn largely from the local area. This reduces transport distances, saves energy and supports local traders.

Efficient, environmental architecture tailored to its location: StationGreen is based on customers' wishes and the needs of your communities.



Our Station Is New.
Its Energy Is Renewable.

At StationGreen, resource-saving energy generation starts right from the top. The roof structure is a ribbed construction of laminated veneer lumber, a renewable natural resource. The StationGreen model in Horrem supports a photovoltaic installation covering 340 m^2 with a total energy production of approximately 31,000 kWh p.a., which is fed into the public power grid. This means we have everything covered (in the truest sense of the word) at StationGreen when it comes to sustainable energy. Solar collectors are used to generate hot water for facilities inside the building.

Roof-mounted solar thermal system. Underground geothermal system.

Let us leave the roof and look deep underground. Here, the carbon-neutral station also provides energy – using a heat-pump system with geothermal probes that allow water to circulate and then carry warmth to radiators and underfloor heating. A brine/water heat pump achieves maximum effectiveness.

"In Horrem we are combining green technologies at a single location for the first time and learning a great deal for our future buildings."

Stephan Boleslawsky,
Head of Regional Unit West at DB Station&Service, builder-owner of StationGreen

Ready to Get on Board, Change Track and **Go Green?**

StationGreen offers passengers a direct connection to their next train and other means of transport. With StationGreen, your community is entering a new era of sustainable infrastructure that goes far beyond energy efficiency. For example, the facade design uses materials drawn largely from the local area. This means that we reduce energy-intensive transport and can adapt the building's appearance to match the local environment.

Green roof and rainwater management.

A biotope right above the tracks? For StationGreen, mobility and environmental protection is not a contradiction in terms. Planted with grasses and herbs, StationGreen's rooftop not only generates solar energy, but also collects rainwater for use in the building's sanitary facilities. Water percolation and evaporation on roof surfaces and the surrounding land creates a slight cooling effect in the building and adjoining areas. As well as improving the microclimate, the green roof and soil boosts insulation. When it comes to carbon-neutral operation, the roof gets a green thumbs up.

"StationGreen represents a new generation of station buildings that combine the latest environmental standards with high levels of comfort and convenience for customers. This station is the proof that sustainable building and state-of-the-art facilities can go hand in hand. It is a model for the future."

Annett Heibel
Marketing/Public Relations
for Construction Projects
DB Station&Service AG

StationGreen **Horrem**

Photovoltaic system
The photovoltaic system installed on the station roof covers 340 m².

Solar thermal system
Heating via solar collectors is also utilised to generate hot water for facilities inside the building.

Green roof
Grasses and herbs grow on top of the station building over an area of 130 m².

Roof sealing

Insulation

Roof structure
of wood and steel

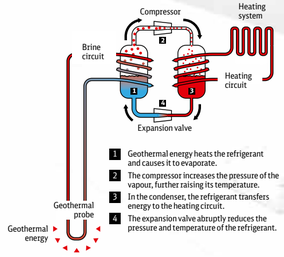
Dropped ceiling
of drywall

Rainwater
Is captured and used to flush the toilets inside the building and irrigate the green roof.

Light and shade
Natural light illuminates every area of the environmentally friendly station.

Environmentally friendly materials
The construction uses renewable materials such as wood and composite wood as well as recyclable materials like glass and steel.

Geothermal system
The geothermal tubes reach 100 metres into the ground. The system serves both to heat and cool the station building.



1. Geothermal energy heats the refrigerant and causes it to evaporate.
2. The compressor increases the pressure of the vapour, further raising its temperature.
3. In the condenser, the refrigerant transfers energy to the heating circuit.
4. The expansion valve abruptly reduces the pressure and temperature of the refrigerant.

Travel centre
Horrem station contains a DB travel centre.

13,500 passengers
use Kerpen-Horrem station each day.

624.4 m²
The surface area covered by the station building.

Unpaved surfaces
Impermeable surfaces are avoided on the land surrounding the station

Why StationGreen? **That's Why!**

A carbon-neutral railway station is an environmental showcase with which any town or city can take responsibility for the future. The many technical details that make the building sustainable are also of great interest for future municipal construction projects. From the resource-conserving energy generation to the green roof, environmentally friendly construction materials and intelligent lighting: StationGreen shows the way.

- **340 m² photovoltaic installation** generates electricity and reduces carbon emissions in the urban area
- **Solar thermal system** for carbon-neutral hot water is an important component of the carbon-neutral station
- **Geothermal system** generates energy for heating and cooling with modern heat pump technology
- Rain water management and a **green roof** as well as the permeable surfaces on the surrounding land supply water for the sanitary facilities and work as natural air conditioning for the building
- **Natural light and LED system** flood spaces with natural and energy-saving artificial light
- **Environmentally friendly construction materials** are part of StationGreen's DNA – from the wooden roof structure to local resources and sustainable materials throughout
- **Station remains open for business during construction** thanks to shorter assembly time and extensive use of prefabrication

Output: Photovoltaic system **35 500 kWh p.a.**
Geothermal heating **29 kW**
Cooling capacity **37 kW**
Primary structure Wooden roof area on steel legs
Facade **Slate 48%** **Glass 52%**
Hall and waiting area **250 m²**

Well-Connected to the **Future?** Digital and Intermodal.

StationGreen is also a digital station, beginning at the ticket desk. Passengers can talk to customer service staff around the clock by videoconference. This cuts costs and offers convenient added value for customers: having someone available to provide assistance around the clock is a natural addition to the travel centre.

Station WiFi. Carbon footprint in real time.

Free WiFi in busy public buildings is essential to our idea of customer convenience. Good digital connections therefore come as standard in the StationGreen programme. And since the station's energy efficiency is something to be proud of, an energy clock displays it in real time.

From the Initial Idea to the **First Train.**

At Deutsche Bahn's architecture office, we first got the green light for the "Station of the Future" programme in 2009. We quickly began to network with other European infrastructure companies in the EU's joint "SusStation" (sustainable station) initiative and introduced StationGreen as a pilot project. Horrem was chosen as the first location, not least because it needed a new station building. Thanks to the commitment by the state of North Rhine-Westphalia, the town of Kerpen and Deutsche Bahn, we were able to turn the vision into a working reality.

Construction started in late 2012. The station opened in July 2014.

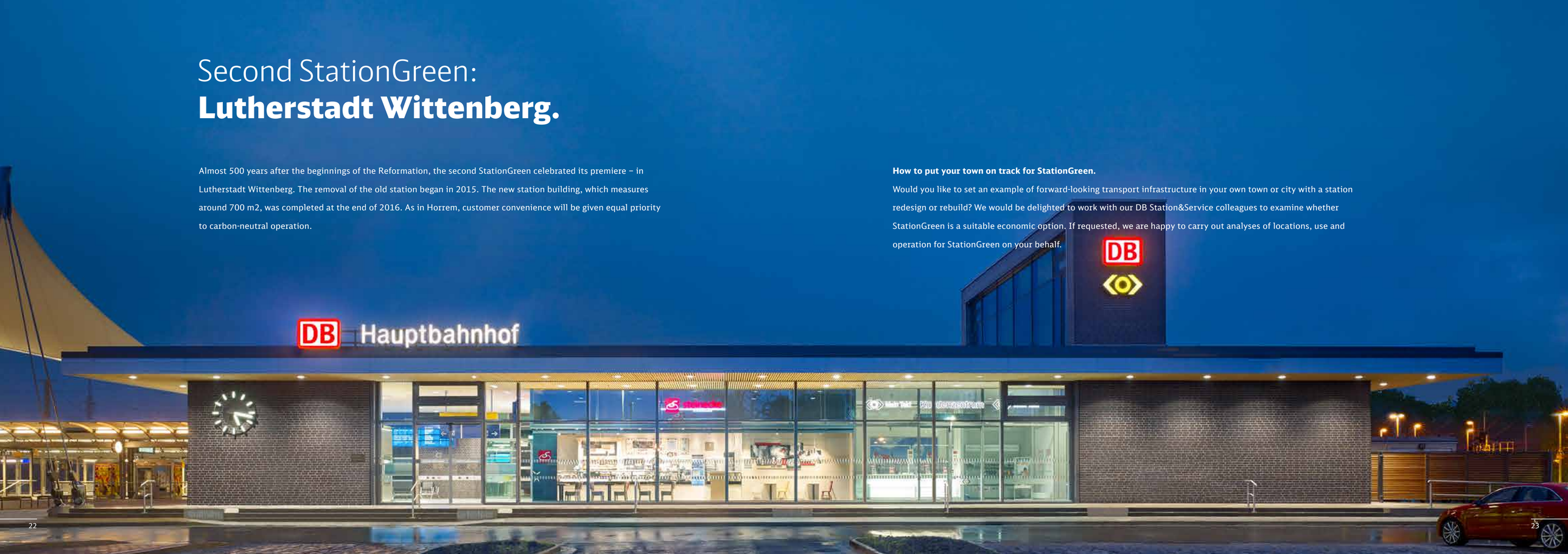
We were able to realise the jointly financed project in just 18 months. StationGreen Horrem officially opened for business on 20 June 2014. The state of North Rhine-Westphalia made the largest contribution, providing 1.3 million euros towards the station project's total costs of 4.22 million. The German Federal Government contributed 1 million euros and 30,000 euros came from the town of Kerpen. DB Station&Service AG invested some 1 million euros of its own funds. StationGreen also received EU funding to the tune of 900,000 euros as part of the Interreg IVB programme.

Second StationGreen:
Lutherstadt Wittenberg.

Almost 500 years after the beginnings of the Reformation, the second StationGreen celebrated its premiere – in Lutherstadt Wittenberg. The removal of the old station began in 2015. The new station building, which measures around 700 m2, was completed at the end of 2016. As in Horrem, customer convenience will be given equal priority to carbon-neutral operation.

How to put your town on track for StationGreen.

Would you like to set an example of forward-looking transport infrastructure in your own town or city with a station redesign or rebuild? We would be delighted to work with our DB Station&Service colleagues to examine whether StationGreen is a suitable economic option. If requested, we are happy to carry out analyses of locations, use and operation for StationGreen on your behalf.



Thank You Very Much.

With StationGreen, we have developed an innovative project that has now also proven its everyday practicality. The responsible approach and architectural concept is inspiring many – and convincing even sceptical jury members. We are proud and grateful of this recognition.

Brunel Award

The railway architecture prize named after the British railway engineer Isambard Kingdom Brunel (1806 – 1859) is awarded every three years at the Watford Conference, an international expert forum of professional designers in the railway industry. StationGreen Horrem received a Brunel Commendation in the "railway infrastructure" category at the award ceremony in Amsterdam on 15 October 2014.

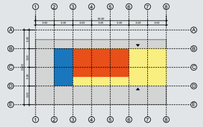
DB Award

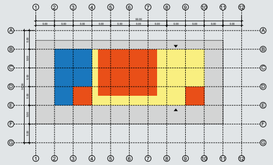
On 11 September 2014, StationGreen received the DB Award for the most innovative project by DB employees in the "environment" category. The DB Award is granted by the patrons Dr Rüdiger Grube and Ulrich Weber together with the whole of the DB Management Board. There are four award categories: Customer, Quality & Innovation, Economic Effectiveness & Growth, Corporate Culture and Environment. Employees from more than 60 countries applied for the award.

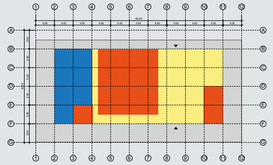
Land of Ideas 2014

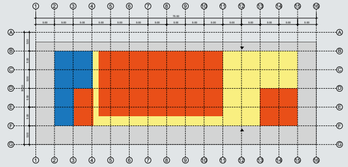
The "Landmarks in the Land of Ideas" award was created by the German Federal Government and is supported by Deutsche Bank. StationGreen Horrem was recognised as one of 100 award recipients in 2014.

DB Award ceremony: The Regional Unit West team, I.SPO and former Member of the Management Board for Construction and Facility Management Rolf Reh (4th from right) celebrate their win









Facts and figures StationGreen

StationGreen – seamless expansion to meet the local requirements and create a tailor-made fit.

BGF: Gross floor area
NF: Usable floor area
VF: Circulation area
TF: Technical operating area

Size S	Area	BGF	300 m²
from 5,000 passengers		NF	138 m²
		VF	113 m²
		TF	19 m²
	of which commercial		approx. 100 m²

Size M	Area	BGF	600 m²
from 10,000 passengers		NF	311 m²
		VF	223 m²
		TF	58 m²
	of which commercial		approx. 210 m²

Size L	Area	BGF	800 m²
from 15,000 passengers		NF	400 m²
		VF	330 m²
		TF	60 m²
	of which commercial		approx. 300 m²

Size XL	Area	BGF	1,250 m²
from 20,000 passengers		NF	650 m²
		VF	450 m²
		TF	100 m²
	of which commercial		approx. 500 m²

Turning strategy **into reality.**

StationGreen is a showcase for the DB 2020 corporate strategy. The strategy sets the clear objective of becoming a profitable market leader, top-ten employer and eco-pioneer within eight years. The three pillars of the strategy – the economic, social and environmental dimensions – are all given equal prominence, meaning, for example, that profitable growth is just as important as sustainability. Satisfied customers matter just as much as satisfied employees. In our "Stations" business unit we are making a contribution to realising all three dimensions of the corporate objectives.

Economic.Social. Environmental.

- **Economic:** The modular, expandable building design is based on the goal of efficient standardisation.
- **Social:** Networking different modes of transport makes StationGreen an intermodal mobility hub where boarding, disembarking and changing between different transport services is efficient, convenient and disabled accessible.
- **Environmental:** The design, materials and technologies correspond to the latest sustainable building standards. The use of local renewable materials means shorter transport routes and a smaller ecological footprint. Modern technologies such as photovoltaics, geothermal and solar thermal energy, LEDs and rainwater management enable carbon-neutral operation of the station.

StationGreen,
Your Contacts:

We work to design the way stations will look in the future and to safeguard the resulting standards. Our location at the DB Station&Service AG head office enables us to work closely with all the company's specialist departments and maintain direct dialogue with the Management Board.

The architectural department of DB Station&Service AG has successfully established itself within the DB Group as an architecture and engineering office specialising in stations. Our services range from studies, programming and master plans to detailed designs and tenders as well as quality assurance throughout the construction phase. Our experience encompasses new buildings, renovations and retrofitting, transport planning and mobility design. The DB architecture office has been a member of the SusStations Team since 2009 (www.susstations.org) and also a member of the Watford Group, an international expert forum of professional railway designers, since 2012.

Our team comprises around 40 experts in architecture, engineering, transport planning, quantity surveying and administration.

www.deutschebahn.com/architekturbuero

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Visions become reality.

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