

UBA builds answers

Positive energy building in Dessau



Umwelt 
Bundesamt

Sustainable construction

Environmental qualities are paramount

The holistic assessment system for sustainable construction was used for quality assurance. This ensures a comprehensive consideration of the entire life cycle of the building in a transparent and comprehensible form, including the environmental, economic and socio-cultural quality, as well as the technical procedural aspects. The five sub-aspects are each separately assessed under their key criteria groups, comprising about 45 bullet points which are then aggregated by a predetermined weighting into an overall mark. This provides the opportunity of also separately presenting outstanding qualities in one or more subsections.

As user of the building, the main focus in the project implementation for the Environment Agency lay in the environmental qualities. The aim is to achieve gold certification, which represents the highest rating.





Landscaping and Percent for Art

Continuation of existing features

The design concept picks up and develops the features of the existing landscaping on the site. So for example, there was a continuation of the extensive planting of herbaceous perennials and wild herb meadows in addition to indigenous trees and shrubs. The park-like character of the site is reflected in the layout of the paths and the selection of the planting. The rainwater infiltration takes place entirely within the site. Only 13 % of the surface of the external works is fully sealed with a further 16 % partially sealed. The ecological value of the design is evident from the careful selection of planting, hard surfaces and site furniture and fittings. In addition to those already existing on the site, employees and visitors have at their disposal 73 cycle stands, 67 of which are in a pavilion, plus a further 32 car parking spaces.

The artworks: *Kohlfelsen* [Coal Rocks] by Cornelia Buchheim are being installed in the grounds, they will enclose the building's two ventilation pipes. The design is distinguished by its contextual, associative references to the location. These are primarily based on the impression made by the charred timber surface. Inside, Michael Sailstorfer has created an artwork called *Sonne* [Sun]. The sun consists of a disc composed of several imprints of honeycombs.

Construction materials and components

Environmental protection and resource preservation combined with healthy room air

About 1,650 m³ of recycled concrete was used, representing approximately 60 % of the total shell works. Hemp insulation is built into the internal walls. The composite timber windows have an aluminium skin on the weather side and triple glazing to Passivhaus standards. The floor finish consists of solid oak parquet that guarantees a long service life. The selection of low-emission and non-toxic building products (e.g. wall paints) supports the objective of achieving a very high indoor air quality in the building. The high quality of the air with regard to volatile organic compounds was verified by the accompanying ambient air measurements.

The naturally occurring refrigerant, propane, is used to operate the heat pump. An extensive green roof system has been installed underneath the photovoltaic modules. LED lighting contributes to the reduction in energy demand. No expanding building foam was used on the dust-free and low-noise construction site, which operated on green power.







Key project data

Brief project description

User: German Environment Agency (UBA)

Landlord: Institute for Federal Real Estate

Building authority: Construction and Property Management

Saxony-Anhalt, Ministry of Finances Saxony Anhalt

Architect: Anderhalten Architekten

Building services engineers: WINTER – beratende

Ingenieure für Gebäudetechnik GmbH

Landscape design: ST raum a.

Monitoring: Federal Institute for Research on Building,

Urban Affairs Spatial Research

Construction start: April 2016

Completion: March 2018

Total cost: EUR 14 M (approx.)

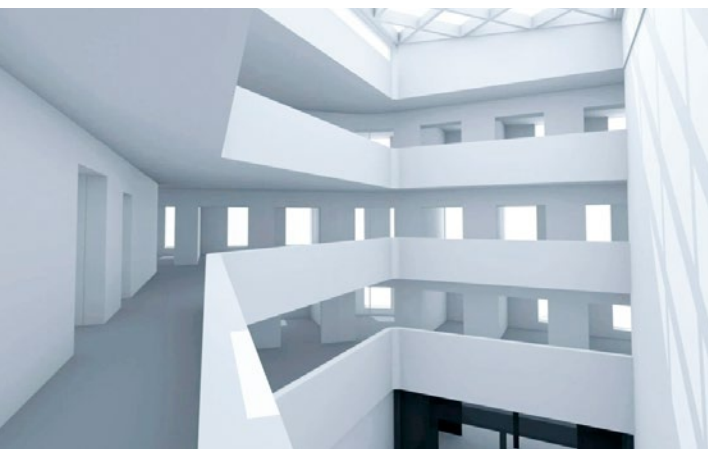
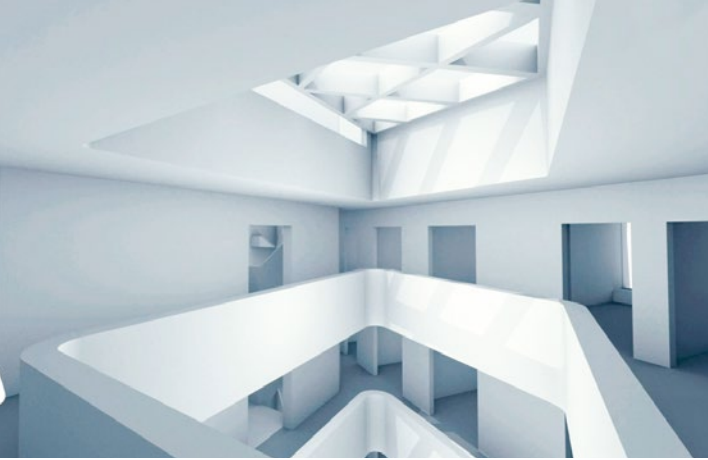
Usable area: 2,247 m²

Gross floor area: 4,780 m²

Workplaces: 111







Architectural concept

Amorphous building form and eye-catching facade design

The design makes a convincing statement as a compact free-standing building that not only fits into the existing urban design concept as a natural component of the entire property, but also effortlessly and self-confidently asserts its own independent architectural expression. An intelligently designed folded facade, in which photovoltaic elements alternate with windows, increases the surface area. The photovoltaic elements are set at 75° to the ground and create a unique pattern of light and shade over the facade of the positive energy building.

The 111 workplaces are predominantly accommodated in one and two-person individual offices, while modern forms of office organisation are managed in two open-plan office areas. In the ground floor conference area there are two conference rooms, one of which can be subdivided into two rooms, each for 40 – 60 people.

Energy concept

Renewable energy meets the demand

With an output of 74.7 kWp, the facade is the power station of the building. Together with the photovoltaic system on the roof (57.4 kWp), they provide electricity for operating the building from a total area of 826 m². When there is excess production, the renewable power is used on the rest of the site.

As a means of exploiting the geothermal potential, a 54 kW heat pump with 32 probes uses building component activation to heat the floors in winter. In summer conference rooms can be cooled directly from the earth probes via this building component activation. The offices are naturally cooled in summer using free night-time ventilation with the help of motorised pivoting windows. The offices are not air-conditioned. In the transitional seasons the offices are ventilated via the windows. In winter and summer efficient heat exchangers minimise energy losses due to heating or cooling. To ensure fire protection, the entire building is

equipped with a sprinkler system. Solar shading, window opening, room temperature and ventilation are each controlled from a control panel in each room. The lighting system is fitted with daylight and presence controls. In the two atria, the stack effect is used to naturally ventilate the spaces via vents on the ground floor and in the roof.

Air temperature, operative temperature, relative humidity and CO₂ content are measured in 15 reference rooms, the data being used, among other things, to control the building via the BMS. The adjustment of the building's technical systems through a monitoring period extending over several years is an essential element in operating the building with minimal energy over the long term.

The primary energy demand of the building has been shown to be 32.8 kWh/(m²·a), a value that is 76 % below the required energy standard set in the EnEv 2009 regulations.



The implementation objective

The object of the project is a positive energy building that is not only able to provide all of its own annual energy needs, but also produces a surplus for the rest of the site. Data from approximately 340 data points is collected and evaluated by the BMS as part of a comprehensive monitoring programme.

German Environment Agency (UBA)

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Visitors have access to the Forum (foyer) and to the exhibitions in the Forum during the opening hours of the existing building.

Mon – Fri	6am – 10pm
Sat	6am – 4pm
Sundays / Public holidays	8.30am – 4pm

The visitors' room (information material) and the library in the Forum of the existing building are open:

Mon – Wed	9am – 3.30pm
Thu	9am – 5pm
Fri	9am – 2pm

Visitors who would like to find out more about the architectural and ecological design concept and to visit the atrium can join one of the guided group tours. Further details can be found in our visitor centre or on our website.

Related link:

<https://www.umweltbundesamt.de/node/14168>