

Frankfurt's Turmcenter is a trendsetting solar-cooled building

From a concrete skeleton structure to an exemplary green building: the Turmcenter Frankfurt, with its impressive design for sustainability and energy efficiency, is situated in Eschersheimer Landstrasse. It was constructed in 1970 but left vacant with its core removed from 2005, then Drees & Sommer developed a sustainable energy concept in the framework of its general mechanical, electrical and plumbing (MEP) planning and thus enhanced the value of the building by markedly improving the efficiency and attractiveness of the rooms. The company's experts also supported the client in obtaining a LEED Gold sustainability certification for the building. At the end of 2018, the British private equity investment company Benson Elliot sold the revitalized 74-meter office tower to the Swiss UBS for a private wealth mandate.

‘With the planning by Drees & Sommer, we have been able to achieve comfort and maximum amenity value for the users in the Turmcenter Frankfurt, and at the same time to fulfill the highest standards of sustainability and economic efficiency for the operator,’ comments Georg Strassner, Principal and Head of Germany at Benson Elliot. The new energy design aims to make the best possible use of the existing energy potential and renewable energy throughout the year. It is the first office building in Germany to use the whole of its glass façade as a year-round *energy collector*.

In the winter and the transition seasons, the Turmcenter Frankfurt uses the building's internal energy transfer and storage system. The sun's heat from the side facing the sun is transported to the shaded side of the building, allowing the rooms to be heated naturally. In addition, excess heat from south-facing IT and conference rooms is transferred to north-facing areas. In combination with solar thermal energy, a heat pump, recycled heat from the sun and the excess heat from rooms, 90 percent of the heating is provided from regenerative sources.

Using the sun for cooling in the summer

The Turmcenter Frankfurt plays a pioneering role in Europe because 65 percent of the cooling in the building is powered by the sun.

Even in the summer, the solar radiation is upcycled via a solar thermal installation on the roof and used to produce regenerative cooling. This is achieved by an adiabatic cooling process using a DEC system which involves drying and evaporation processes.

The excess heat which arises from the cooling ceiling system is also used to generate cooling energy and for the ventilation system. Thus, the Turmcenter Frankfurt harnesses its energy and excess heat potential all year round, and it feeds this potential back into the building via energy recycling or upcycling.

More office space and room comfort due to innovative technology

‘The energy design in the Turmcenter is based on using less technical equipment, but with innovative technology that provides improved efficiency. The annual energy consumption is particularly low with this energy design. It is 40 percent below the requirement of the German Energy Saving Ordinance 2014 (*Energieeinsparverordnung – EnEV*) and 15 percent below the green building standard,’ says Norbert Otten, Partner at Drees & Sommer SE. The new energy concept enhances the value of the building as a whole. The technology used reduces the energy costs to significantly below one Euro per month per square meter.

The amenity value is also enhanced by the absence of a continuous suspended ceiling, which makes the rooms higher, and by windows reaching down to the floor instead of a perforated façade. In place of an air circulation ventilation system for heating and cooling, the building uses radiation ceilings which provide a high sense of thermal comfort without overheating or draughts. Humidification in winter and dehumidification in summer as well as the optimum use of daylight are added. In the original planning, a large proportion of the roof space was taken up with sprinkler and refrigeration systems. The new concept reduced the space needed for technical installations on the roof and on the top storey of the high-rise building, which has therefore been converted into extra rental space as an exclusive penthouse office with four meter high ceilings. This was possible because the conventional sprinkler systems were replaced by a stationary low pressure water-mist fire suppression system.

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Building Information

The Turmcenter in Frankfurt am Main, Germany, was completed in 1970. It was vacant for many years up to 2013. The building is 74 meters tall, has 21 storeys above ground level (including the first floor) and is supplemented by a multistorey car park with 400 spaces. In the course of the general MEP planning, Drees & Sommer developed a sustainable energy concept which raised the value of the building by significantly improving the efficiency and attractiveness of the rooms.

Frankfurt Turmcenter as a trailblazing solar-cooled building



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Key Terms

Energy efficiency

Sustainability

Solar cooling

Key Data

Client: Benson Elliot

Project location: Frankfurt am Main, Germany

Drees & Sommer services: Development of a sustainable energy concept in the framework of the general MEP planning, green building certification

Sustainability certification: LEED Gold



Norbert Otten, Partner at
Drees & Sommer

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Special Features

The energy concept developed by Drees & Sommer has made the Turmcenter into a trendsetting building. The goal of the planning was to make the best possible use of renewable energy and the existing energy potential throughout the year. Therefore the annual energy consumption is particularly low. It is 40 percent below the requirement of the German Energy Saving Ordinance (*Energieeinsparverordnung – EnEV*) and 15 percent below the green building standard. In the winter, the building calls on its internal energy transfer and storage system. In the summer, the building is cooled with solar energy by means of a DEC system. The very low auxiliary costs of only about EUR 3.60 per m² per month (source: Benson Elliot) are especially due to the high energy efficiency. The reduction in operating costs by over 35 percent is high in comparison with other high rise buildings.