

Heating technology

Visitors usually notice little of the heating technology. The distribution and ring pipes, pumps, valves, heat exchangers and pressure compensation tanks are hidden in accessible supply corridors underground in the show greenhouses. In the corridors, underneath air shafts that lead directly into the individual greenhouses, there are radiators from which the warm air flows upwards in order to always be able to offer our plants optimal conditions.

Optimal climatic conditions in every season

Just as in the open air of the Botanic Garden, plant growth in our greenhouses is also decisively determined by the climatic conditions prevailing there. Only by technically influencing temperature and humidity can an environment be created here in the middle of Upper Bavaria that offers plants from different climatic zones of the earth optimal conditions for growth. Technical equipment for heat and water supply has therefore never lost its importance as a basic important horticultural tool since the garden was founded about 110 years ago. While the winter-cold Upper Bavarian climate inevitably prevails outdoors, the temperatures in the artificially created environment of the greenhouse facilities can be influenced and controlled by heating. Irrigation technology is also essential for the preservation of our precious living collection.

Heating technology then and now

Many tropical plants already suffer considerable damage at temperatures well above freezing. However, sufficient heating is also necessary for structural reasons: To maintain the greenhouse structure, large snow loads must be thawed in winter. The required temperatures in the greenhouses, the

commercial and residential buildings, and the Botanical Institute are provided by a central heating system that is operational all year round. It is located – inaccessible to our public – on the east side of the garden under the two high chimneys. When the greenhouses were built in 1911 and 1912, the gravity heating system still used in the Old Botanical Garden was abandoned because of the extensive dimensions of the overall heating network. To be able to regulate such a system sufficiently – water circulates due to the different weight of hot and cooling water – would have led to too much fragmentation of the heat generation systems. The decision was therefore made to use a pumped hot water heating system, which was modernized several times over the years. In the middle of the 20th century and during the war years, the equipment of six horizontal, wrought-iron, low-pressure tubular boilers changed from coke to lignite until finally the switch to fuel oil was made.
Today, the Botanic Garden is equipped with a modern, computer-controlled heating system that is connected to the city's natural gas network. The boilers switch on independently depending on consumption and provide the necessary redundancy during demand peaks. The exhaust heat from the condensate is recovered via an exhaust gas scrubber and utilized in a separate low-temperature heating system or for return flow boosting.

Control technology

The heating system includes not only the heating center, the distribution lines and the heating system that transfers heat to the greenhouse itself and to the crops, but also the control technology. The heating and climate control systems maintain the temperature at the value specified individually for each greenhouse. The heating of the 21-meter-high dome of the palm house requires special control. A higher pressure must be generated, which is achieved by a secondary circuit with a separate heat exchanger and corresponding expansion vessels.

An emergency power generator is available for acute emergencies to ensure the functioning of the heating systems as well as the ventilation and shading motors in the event of a power failure at temperatures that are too low in winter or too high in summer.