

energetic building concept high-rack building I M 1:200

High-rack building with natural climate control and minimal CO2 footprint

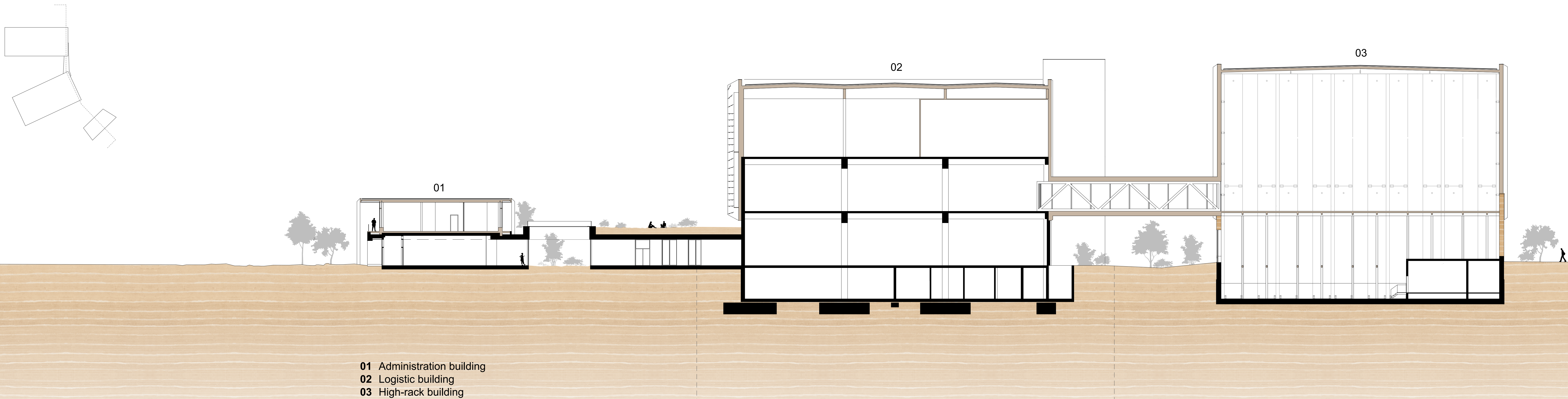
High-rack warehouses for pharmaceutical products require strict adherence to temperature and humidity limits of 15 to 24°C and 40 to 65% relative humidity in accordance with GMP - good manufacturing practice. In order to meet these requirements as far as possible without air conditioning, Transsolar developed a holistic concept for the Weleda high-bay warehouse that relies on natural sources of heat and cold and can buffer external and internal heat and humidity loads via a large heat and humidity buffer through an 8 m high rammed earth wall. The basic requirement was an extremely tight building envelope in order to minimize heat and moisture transport through infiltration. To tap into the free cold from the ground, the high-rack warehouse was lowered 5 m and the 3500 m² floor plate was placed on the ground without insulation. The surrounding concrete walls of this lowering are insulated and serve as a heating source for the 30 m high storage room via inserted pipe coils. Above the first floor 8 m high rammed earth wall made from local soil is a 20 m high insulated timber wall construction, which is supported by the roof back onto the wooden high rack.

Taking into account the daily storage and retrieval operations, the heat gains from the storage and retrieval machines and the moisture and heat capacity of the stored goods, the design simulation shows that the temperature and humidity requirements can be met if the storage and retrieval machines are also used to mix the 30 m high room volume when not in use. This made it possible to avoid a mechanical ventilation system, which was still installed but never used in Ricola's herb warehouse in Laufen, which also relies on rammed earth walls for natural climate control.

The savings for the installation and operation of the ventilation system compensate for the additional investment in the rammed earth wall over a period of 30 years, another reason for Weleda to opt for this concept.

The negative CO2 footprint of the wooden shelving and the wooden construction for the roof and walls compensate for the CO2 load of the concrete foundation and the low CO2 footprint of the rammed earth wall.

by Matthias Schuler (Transsolar), translated by michelgroup



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