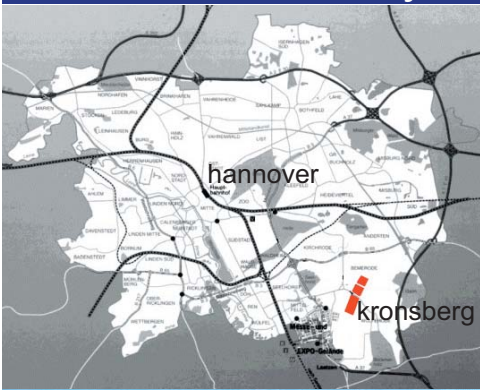


# Kronsberg



location: Hannover, Germany  
 dates: Planned 1990-1994, 1996-2000 first phase. Ongoing.  
 type: New construction in greenfield area at city edge.  
 use: Residential, services, open space.  
 size: 160 hectares, 3,000 dwellings first phase, final size 6,000 dwellings.  
 people: 6,500 residents first phase, 15,000 after completion. 3,000 jobs created nearby.  
 actors: City of Hannover, EXPO 2000 Corporation, IDB and other private investors, State of Lower Saxony, and the City Construction Directorate (responsible of ecological matters.)  
 goals: •Reduce CO2 emissions by 60% compared to current standards for conventional residential buildings, primarily through Low Energy House (LEH) construction methods.  
 •Apply “all the most modern expertise on the ecological construction and habitation in the spirit of Agenda 21”, Agenda 21 being the key document from the 1992 UN Conference on the Environment and Development in Rio de Janeiro.

## energy use KWh/m2

household electricity, goal	35
household electric, achieved	50
heating energy, goal	50
heating energy, achieved	56

## construction

elimination of thermal barriers  
 low-energy house construction  
 non-toxic and certified materials use  
 water-saving fixtures  
 energy-saving appliances

## site ecology

storm water retention and collection  
 waste management innovations  
 excavated soil re-used on site

## systems

district heating	x
combined heat and power	x
solar panels	x
solar cells	x
wind power	x
natural ventilation	x
forced vent. w/ heat recovery	x
non-renewable energy	x
individual metering	

## special projects

district solar heating  
 'microclimate zone' development  
 resident participation  
 distributed elderly housing  
 32 terraced 'Passive Houses'  
 3 wind turbines, 3.6 MW  
 2 decentralized CHP plants  
 1350 m2 solar collectors, thermal heat

## amenities

primary school with sports hall  
 3 children's day centres  
 17 community-use rooms  
 health center  
 shopping center  
 shops, cafes, restaurants  
 KroKuS arts and community centre  
 Protestant church centre



## process and history

Expo 2000 was the catalyst for the development of the Kronsberg area, directly south and east of the existing city edge and within the city limits. Hannover had been well aware of a need for housing, facing a huge shortage as the year 2000 approached, and the Kronsberg area was the last available location for a large new housing project. The EXPO provided an opportunity both to partially solve the housing problem and give the city a compelling reason to develop the area; in the spirit of the Exposition it was also obliged to develop it in accordance with a host of progressive principles. The ownership by the city of most of the land, the development of the project as part of the exposition, and the funding that accompanied it, allowed the city to create contracts and form partnerships that would maintain the entire project's adherence to strict ecological criteria. To create a viable neighbourhood, it was decided that the design emphasis would be to create this project "within the realm of general public acceptance. Thus the



all photos: Karl Johaentges

### process and history, continued

practicality of the district for its residents took priority over presentation of spectacular projects.” Competitions were held initially for an urban development scheme, and later for a plan, that emphasized a dense urban living typology consistent with that of the rest of the city. Requirements included minimizing the percentage of space dedicated to roads and maximizing well designed open space and green space. For the first development phase, 2 distinct neighbourhoods were developed: Kronsberg Nord and Kronsberg Mitte, each with their own district square and connected to the city centre by tram. 10% of the project was dedicated to single-family housing, while 90% was for apartments.

### ecological optimisation

A comprehensive plan was required to apply best-practice principles over the entire project, requiring strategies for responsible soil, water, and waste management, site construction waste management, use of environmentally sound building materials, energy-efficient construction techniques, and the use of renewable energy sources. This comprehensive programme became the ‘Energy Efficiency Optimisation at Kronsberg’, which is now, according to the City of Hannover, “a model urban development project and currently the leading ecological construction programme in Germany.” It is an EU-funded ‘Thermie Project’. The Kronsberg Environmental Liaison Agency (KUKA) was set up on site by Hannover City to facilitate coordination of the different projects together with City administration, disseminate information, and provide information and training to all stakeholders. The City of Hannover determined that Kronsberg could reduce CO<sub>2</sub> emissions by 60% compared to typical residential developments, “through savings on heating, hot water, and electricity use with no reduction in living comfort or homeliness.” It was mandatory that all building construction adhere to Low Energy House (LEH) standards, which would work in conjunction with renewable energy sources to achieve this 60% reduction goal.

A quality assurance programme was devised consisting of quality inspectors that would examine building plans and oversee construction to ensure LEH adherence; KUKA also coordinated in consultation with Hannover City and offered training sessions to architects, builders, and tradespeople to educate them on energy efficient construction, and advised residents on energy-saving measures.



Heating for all buildings is supplied either through decentral gas-fired cogeneration (CHP) plants, which are between 80-95% efficient, or through alternative and renewable sources of energy. Passive solar houses in the project use heat exchangers to meet their heating needs. One of the CHP plants is run by fuel cells, and was a demonstration project for the Exposition. Two wind turbines provide 3,000 dwellings with electricity, a solar powered district heating plant provides 100 dwellings with half their heating energy needs, and PV cells provide supplementary power to the primary school and the arts centre.

The Kronsberg Water Concept deals with the effects that a large development can have on the local water table, the necessity for water conservation, and raising awareness of water issues through visible systems. "The 'Mulden-Rigolen' system for decentralized retention and infiltration of rainwater" was used throughout Kronsberg to create a system of retention and infiltration that would not cause large changes to the local water ecology.

The Kronsberg Waste Management Concept includes building waste, and domestic and commercial waste. By requiring developers to use materials for construction that are non-toxic and recyclable, 80% of construction waste was not landfilled. Systems for pre-sorted waste collection, encouragement of home composting, and encouragement for retailers to use low-packaging retail goods were part of the domestic and household waste plan, as well as a "dense network of repair and alteration services" throughout the development that encourage people to follow the motto 'mend it, don't dump it'.

### funding

Subsidies by the city and other sources, including the EU, paid for the extra costs in both the larger systems development and the building construction to allow the project to function within the guidelines of the ecological standards. Publicly owned land was sold to private developers to raise money for public amenities. Federal, state, and local officials created a housing fund to ensure that a mix of persons from different income levels would be able to afford to live in Kronsberg.

### energy targets and quality assurance

Energy efficiency targets have been met in Kronsberg. All buildings within the project were required to meet the LEH standard, and to achieve this a Kronsberg calculation method was employed. This calculation method consisted of an electronic data sheet that was given to planners and architects in the beginning stages of design. Only the maximum heating energy index was fixed; by altering such components as materials with different u-values, the surface area, type and aspect of windows, the type of ventilation system, and other variables, the architects and planners could develop their projects simultaneously in compliance with the Kronsberg standards. 7 independent quality assurance bureaux were brought together and chaired by the City of Hannover to draw up a proper assessment method; developers then hired the quality assurance bureaux to analyse their projects and file a report with the City.

Quality assurance began with the checking of the calculation method against plans, with particular attention paid to insulation, airtightness, and ventilation; then detailed plans and drawings were examined; workmanship on the building site was then evaluated and checked; air-tightness measurements were taken on the final construction; and finally, a report was created detailing all aspects of the quality assurance steps taken along the way. Costs of quality assurance were between 4-8 €/m<sup>2</sup>; this was offset by subsidies covering 50% of these costs.

Another portion of the quality assurance involved the 'skilling and qualification' of the planners, architects, and tradespeople. This programme involved "specialist conferences, one-to-one consultations, short-notice site meetings, and rapid-response training sessions. In-house seminars were taken to the premises" of the business managers and developers of the projects; this maintained a vertical integration of the necessary information required to achieve the LEH goals among all players involved. Additionally, the 'skilling and qualification' programme offered seminars for future residents.

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**sources:** **Modell Kronsberg, Sustainable Building for the Future** City of Hannover. Published by Landeshauptstadt Hannover, September 2000  
**Hannover Kronsberg: Model of a Sustainable Community** City of Hannover. Published by Landeshauptstadt Hannover and KUKA, 1998

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