New House of the Region of Hannover – Energy Efficiency in a Public Private Partnership

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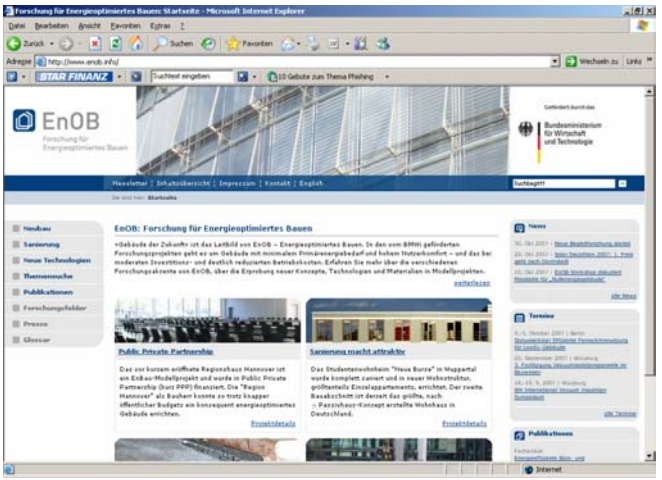
EnOB Forschung für Energieoptimiertes Bauen

proKlima Der enercity-Fonds

Presentation

1. **EnOB**
2. **Competition**
3. **Design**
4. **Quality and FPTs**
5. **Perspectives**

ENOB: Low Energy Demonstration Buildings in Germany



www.enob.info

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Demonstration Buildings

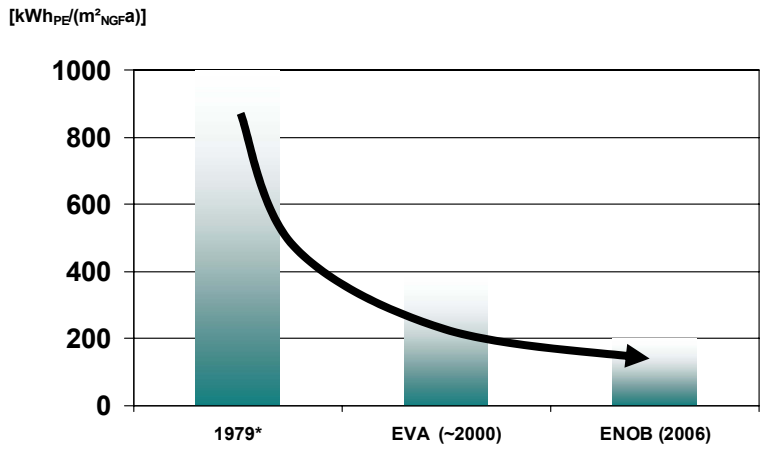
International Solar Center Berlin

~ 22.000 m²

Center of Informatics, Braunschweig

~ 7.500 m²

Annual primary energy consumption of office buildings



Source: Siegel, Wonneberger

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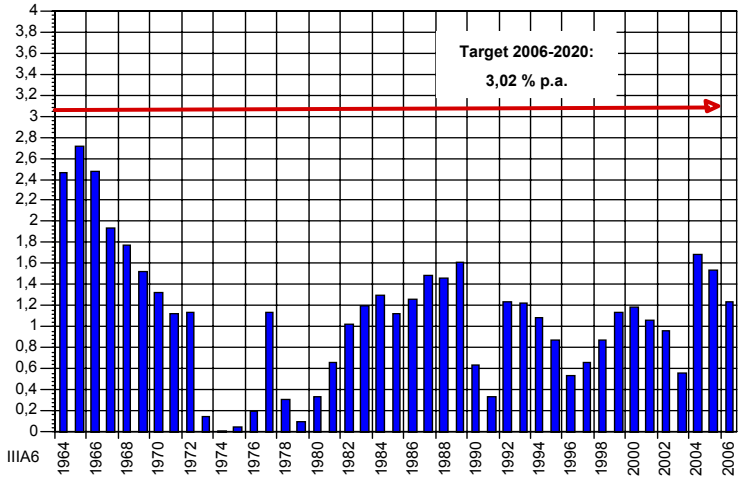
Annual reduction of specific energy consumption (14-year average)



Source: BMWi, Specific energy consumption: GJ/1000 Euro BIP

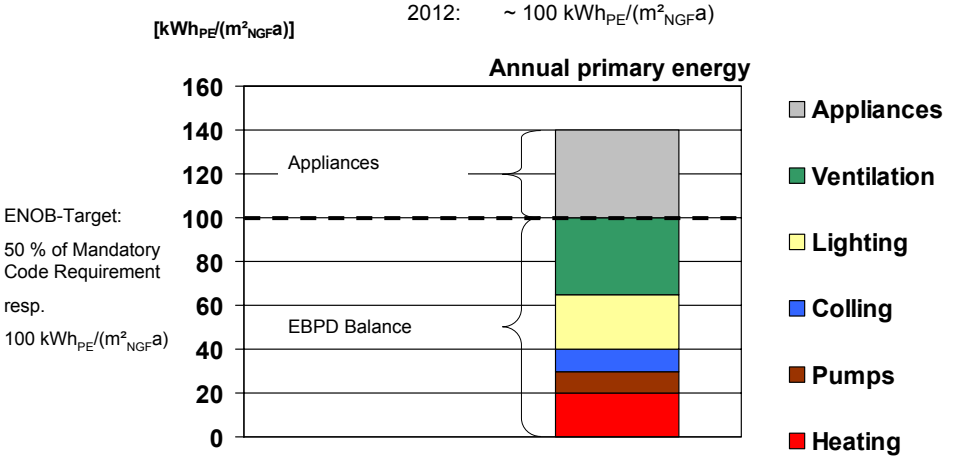
EPBD – European Performance of Buildings Directive

Target value for new office buildings

2007: 180 – 240 $kWh_{PE}/(m^2_{NGF}a)$ (since Oct. 1st)

2009: ~ 150 $kWh_{PE}/(m^2_{NGF}a)$

2012: ~ 100 $kWh_{PE}/(m^2_{NGF}a)$



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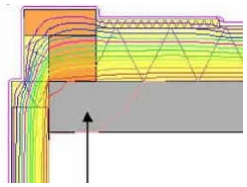
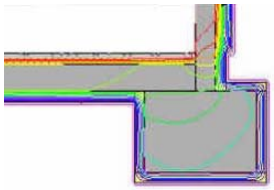
- **Addition to an existing campus**
- **300 employees and conference facilities**
- **Public Private Partnership**
- **50 % below mandatory code requirement!**
- **No extra cost!**

Functional Competition Brief



Now included in DIN V 18599

- **PE Heat:** < 40 $kWh_{PE}/(m^2_{NGF}a)$
- **PE Heat+Electr.:** < 100 $kWh_{PE}/(m^2_{NGF}a)$
- **Transmission envelope:** 45 % below mand. value
- **Transmission windows:** <= 1,2 W/(m²K)



- **Architectural:** Limits for the size of windows
- **Technical:** Natural ventilation in offices, AHUs, Pumps, Lighting
  Improved insolation for pipes, air ducts etc.

- **Target values for thermal comfort**
- **Functional Testing (Thermal Resp., Blower Door …)**
- **Additional metering devices**

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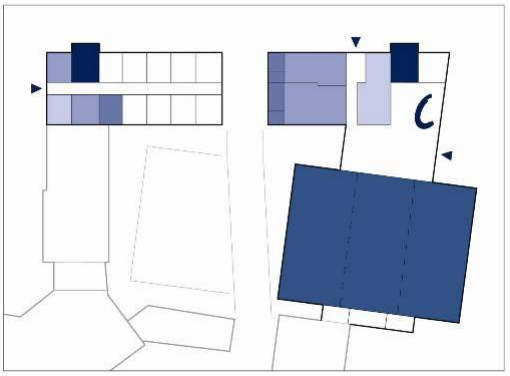
6 Design Proposals

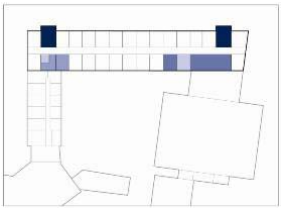
- **All met the basic functional requirements**
- **All met the energy targets**
- **Three met the cost limit**

Architecture

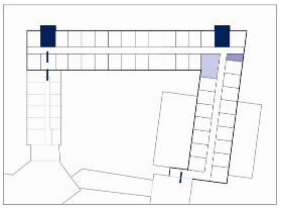


Ground Floor

Stairs
Conference Room
HVAC
Storage / Catering
Restrooms



2. Floor



3.-6. Floor

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Architecture

Photo: Bilfinger Berger

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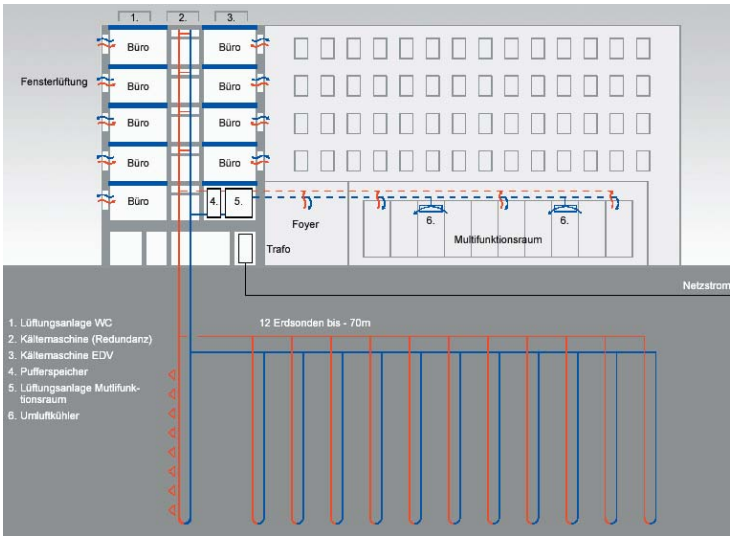
Energydesign



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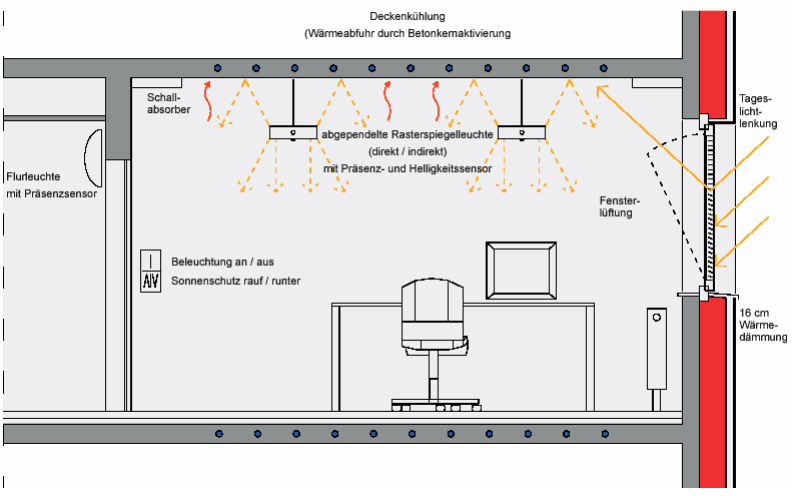
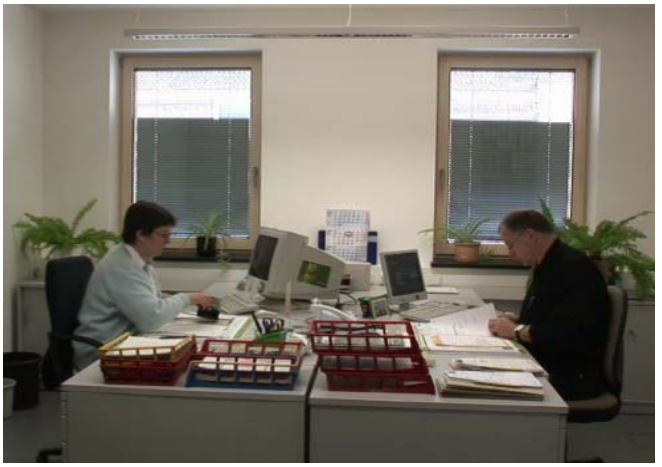


Energydesign



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Energydesign

Quality and FPTs



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Quality and FPTs

Performance measurements:

- **Thermal response of ground probes** **(VDI 4640)**
- **Air tightness (n_{50})** **(DIN EN 13829)**
- **Ventilation rates** **(VDI 2079)**
- **Specific Van Power (P_{SFP})** **(DIN EN 13799)**



Results

- **Ref.-Building DIN V 18599: ~ 180 kWh/(m²a)**
- **Energy Demand: ~ 93 kWh/(m²a)**
- **Construction costs (DIN 276): ~ 1.050 €/m^2_{NGF} (inkl. VAT)**
- **Annual Energy Costs: ~ 40.000 €/a; 5 €/(m^2_{NGF}a)**
- **EnOB-Standard is technically and economically feasible!**

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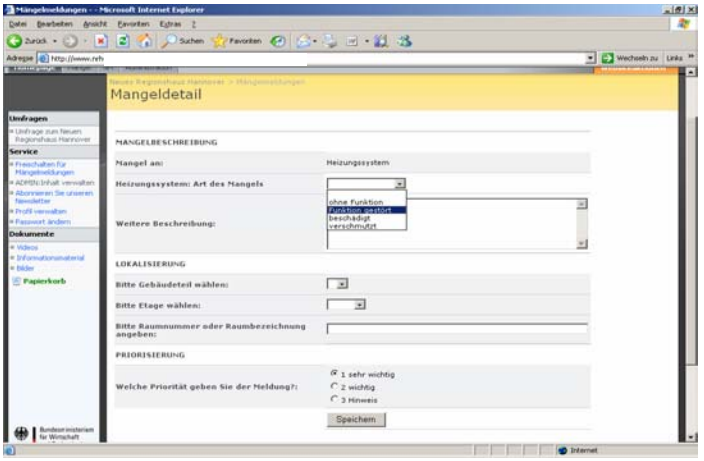
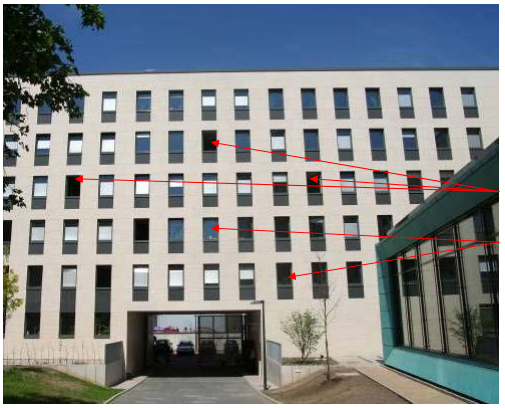
User Service Portal



User behavior



- Ambient temperature > 26°C / 80°F
- Clear Sky

Windows open

Shading system deactivated by users

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Perspective

- Monitoring of energy consumption and user comfort until end of 2009
- Analysis of maintenance cost

→ Methodology for comprehensive life cycle evaluation

DGNB

Deutsche Gesellschaft für nachhaltiges Bauen e.V.

German Sustainable Building Council

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