# LOWESTENERGYCONCEPT LEH * NEH

## LOWESTENERGYHOUSE LEH PN 2753

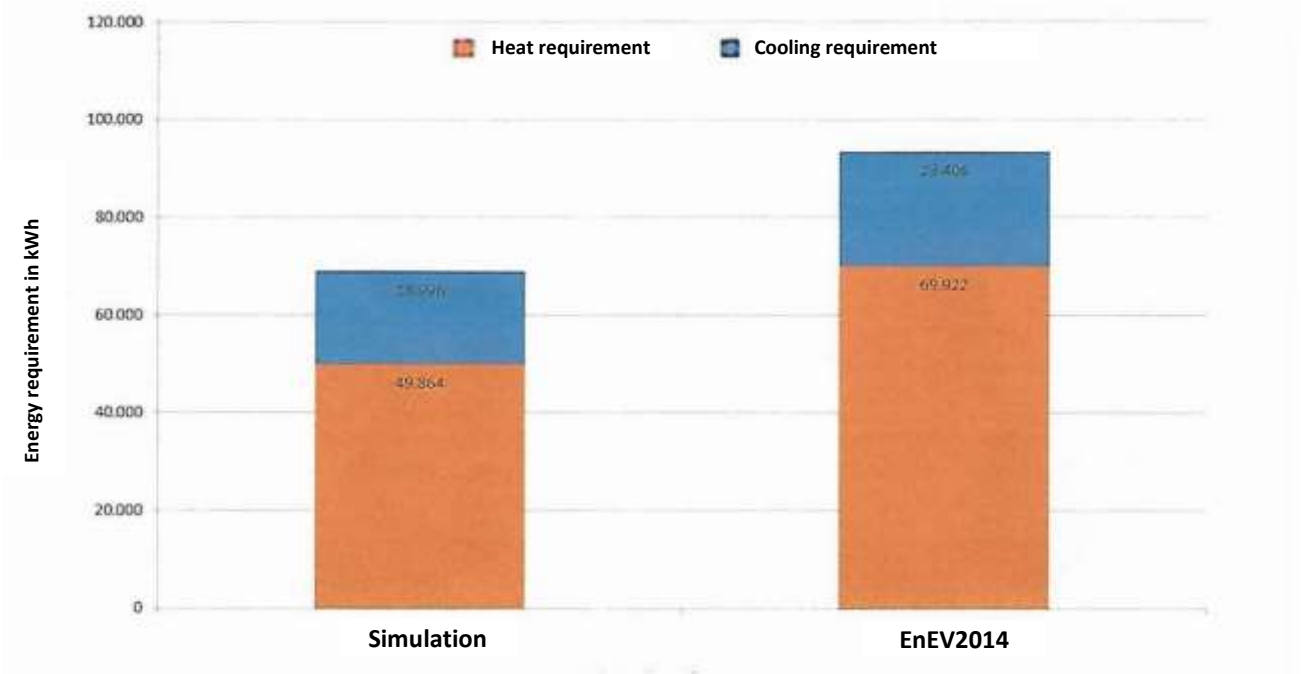
The planning exhibition and office building is heated and cooled with an air circulation system BELA, with approx. 80 % heat recovery from the outgoing air. Electrically powered heaters in the ventilation system equalise the heat loss of approx. 20%. The same principle applies for the cooling. Electric continuous-flow heaters produce hot water for the kitchen and WC facilities.

The necessary thickness of the thermal insulation was not calculated according to EnEV (Energy Saving Ordinance), but instead optimally adapted with a dynamic simulation DyS to the climatic conditions of climate region 5, town of Lohmar NRW. The EnEV stipulates a maximum value for the annual primary energy requirement (Qp) and the transmission heat loss (H't) of a reference building for heating, hot water, ventilation and cooling. The reference project is not equipped with cooling. The building location is not considered. The energy planning for the LEH is not to be realised optimally with the above calculation methods. I have proposed to the German Federal Ministry for Economic Affairs and Energy, BMWi, that the optimal thickness of the wall insulation, in relation to the climatic conditions of the location, be determined with dynamic simulation. In 18.01.2016 the BMWi noted, quote:

“If constructional or systems engineering components are used, for whose energetic evaluation no recognised rules of technology or secured empirical values are available, the energetic characteristic values may be determined via dynamic-thermal simulation calculations. The requirements of the **lowest energy building standard** are not yet defined and are currently being examined as part of an expert appraisal."

Dynamic simulation DyS:

1. EnEV validation of the primary energy requirement with the EnEV reference building, for fulfilling the target specifications.
2. Dynamic simulation of the new building with the reference building point 1, with real boundary conditions, with cooling, on the basis of the climatic values applicable for climate region 5. town of Lohmar NRW.
3. Optimisation of the planned building so that the overall balance is better than the reference data point 2. The necessary primary energy requirement (Qp) in relation to the building is ascertained in the new building. The result documents the maximum attainable annual primary energy requirement (Qp).




| | Simulation | Results EnEV 2014 | Overshoot/Undershoot |
|---|---|---|---|
| Heat requirement in kWh/a | 49,864 | 69,922 | - 29% |
| Cooling requirement in kWh/a | 18,996 | 23,406 | - 19% |
| Total requirement in kWh/a | 68,860 | 93,328 | - 26% |

In general, the result of the energy requirement kWh is characterised by heat / cold recovery from the outgoing air of approx. 80 %. PHI certificate for non-residential buildings heat recovery efficiency: max. = 0.87, min. = 0.80.

A “normal building”, with e.g. gas heating and 0% heat recovery from the outgoing air, was not compared with the LEH. Validation for the energetic standard of a KfW efficiency house 40, 40 Plus, 50 or 55 is provided by an energy requirement calculation. The following applies here: the higher the energetic standard, the higher the potential repayment bonuses. The energetic standard of the LEH is the absolute lowest owing to 80% heat / cold recovery. Correspondingly the LEH has the

**lowestenergyhousestandard**.