Bauentwurfs-Assistent **[BEA]**

INFORMATION ADVANTAGE FOR NEW INNOVATIVE CONSTRUCTIONS

The upturn in the real estate industry is ongoing. Favourable interest rate conditions and the search for secure yield and investment opportunities are causing investor demand for real estate to grow continuously. At the same time, requirements for thermal building properties are increasing due to rising summer temperatures and shifting comfort preferances. Industry pioneers have long since recognized the opportunity to gain a market advantage in terms of both costs and demand through technical and financial innovations. They are thus reacting to changes in preferences of end-consumers, politics and the financial sector, who are increasingly paying attention to the ecological properties of buildings, as well as the rising comfort requirements of users.

Sufficient economic incentives for the construction of sustainable building projects exist. Nevertheless, these are often rejected in favour of conventional projects. A key reason listed by property developers for this rejection, are that hidden costs are revealed during the planning process, risks are incorrectly assessed and operational objectives remain unfulfilled. The term "principal-agent problem" is commonly used to summarize this issue: A property developer (principal) commissions a building technician (agent) because he assumes that the latter has a higher level of information than himself, or can obtain the required information more cheaply. The problem results from the different objectives of the parties involved. The property developer cannot costlessly evaluate why and on what basis the building technician bases his decisions and recommendations on. He must assume that the building technician makes use of this information-gap to his own advantage. The ensuing increase in planning costs and uncertainty raises doubts about the profitability of innovative energy concepts until they are often rejected completely.

THE SOFTWARE-SOLUTION: BEA

Simple building geometry inputs by the user are sufficient to calculate energy performance indicators with BEA, based on local weather data and construction norms. Most notably, BEA can quickly check whether a building design is in compliance with selected building energy standards. During the preliminary design phase, BEA provides property developers with crucial information for further planning steps of the heating and cooling concept. It also enables them to objectively evaluate existing concepts presented to them by planners. This reduces unnecessary planning costs and dimensioning errors, minimizes risk surcharges and prevents space losses due to excessive insulation measures. As a result, a concept is created in just a few steps, where different options are evaluated and compared with regard to energy criteria (heating demand, cooling demand, loads, emissions). In the next step, this output can be used for economic valuations.

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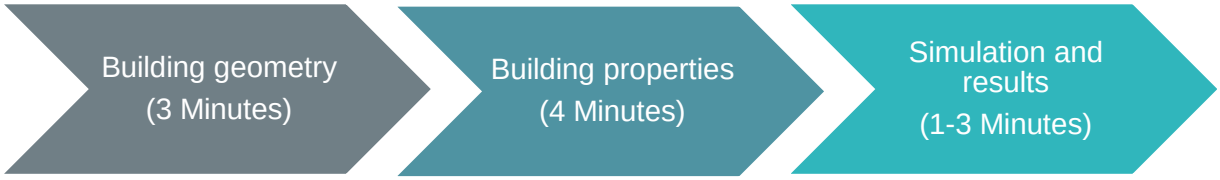
TECHNICAL ANNEX: USING THE TOOL

The decision-support tool BEA is a development of the AIT Austrian Institute of Technology and is based on scientifically recognized simulation tools and optimization algorithms. The data inputs include site-specific climate data and default values for component properties in conformity with building standards. In its first development stage, BEA was primarily designed for the energy evaluation of new building projects. In its second development stage it will be used for the energy and economic evaluation of renovation options for existing buildings in Austria and Germany.

In three simple steps and with little configuration effort[1], refurbishment options can be evaluated energetically, thermally and (in the future) also economically.

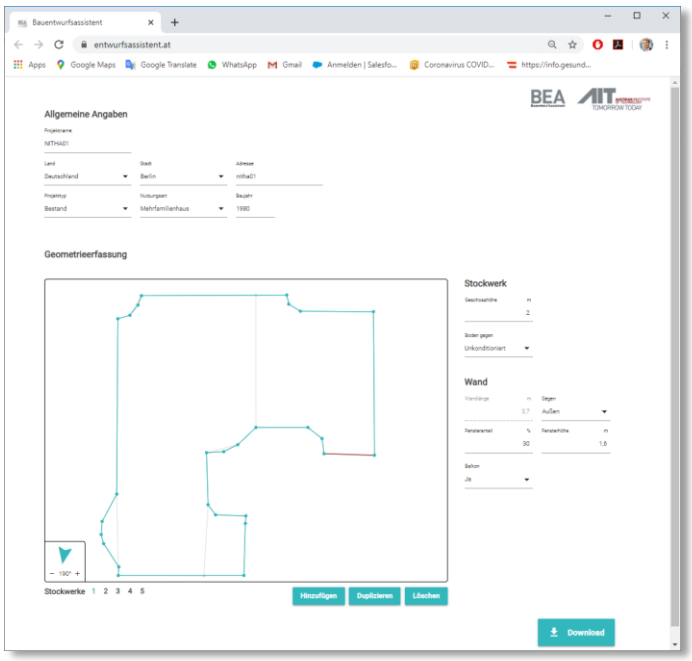


1. Building geometry: Users trace the building floor plan and enter key facts into an input mask to create a project. Existing floor plans can be imported in pdf format as a drawing basis or redrawn manually.
2. Building properties: Subsequently, structural and technical building characteristics such as the type of heating and cooling system, wall types, roof structures and shading measures are inputed. The user selects various parameters, which are to be subjected to a comparative energy evaluation.
3. Simulation and results: After about 1-3 minutes (or more in the case of very complex geometries) the results of the dynamic, thermal energy demand simulation are available in hourly increments for an entire year. The results are visualized online or in a detailed pdf report.

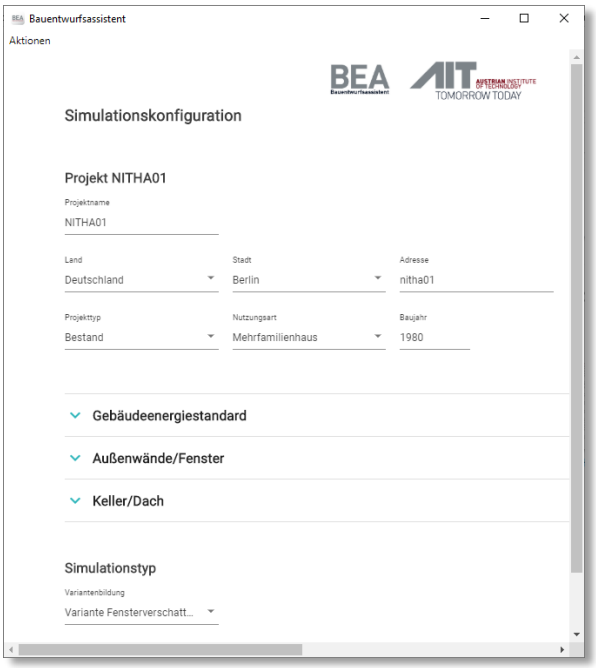
[1] The simulation time depends on the complexity of the building geometry and is between 30s and 5 minutes per building

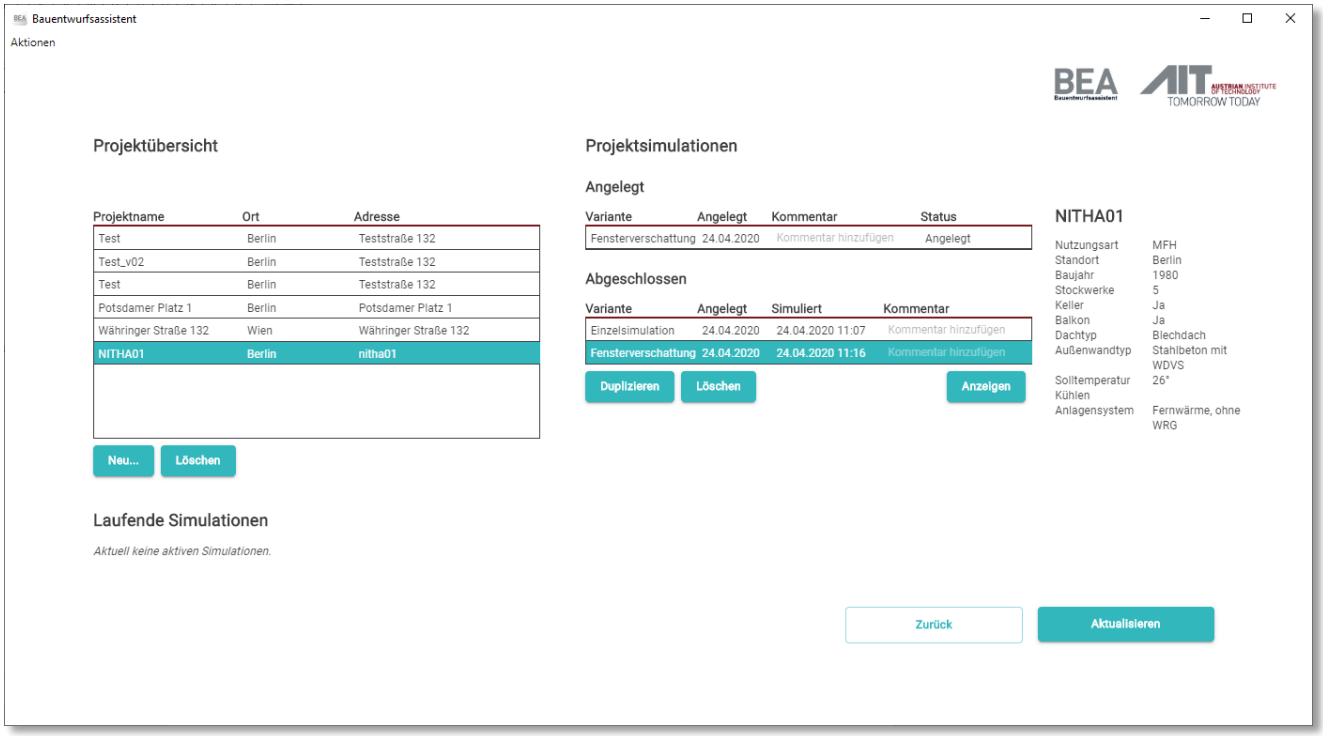
SURFACES

Inputing building geometry



Building properties – inputing key parameters





Simulation Results

Table of results

Fensterverschattung	Außenliegend	Innenliegend	SVG	Ohne
Wird der gewünschte Baustandard erfüllt?				
Außenwand Konstruktionsgrundfläche in m²	84,09	84,09	84,09	84,09
Primärenergiebedarf (PEB) in kWh/m²a 1161,87m² Nutzfläche	53,44	59,94	60,15	62,18
Heizwärmebedarf (HWB) in kWh/m²a 1161,87m² Nutzfläche	59,30	59,11	67,80	58,95
Kühlbedarf (KB) in kWh/m²a 1161,87m² Nutzfläche	1,45	6,90	1,72	8,84
Jährliche CO2 Emissionen in kg/m²a 1161,87m² Nutzfläche	0,31	1,46	0,36	1,87
Maximale jährliche Heizlast (H) in kW	29,03	29,03	31,09	29,03
Maximale jährliche Kühllast (K) in kW	11,03	21,84	12,04	23,52
Transmissionswärmeverluste in W/m²K Gebäudehülle	0,77	0,77	0,77	0,77
Höchstzulässige Transmissionswärme-verluste in W/m²K Gebäudehülle	0,50	0,50	0,50	0,50

Diagrams