The Concept of ENERGY|BASE International

A Cooperation of UAS Technikum Wien/Austria, CTGU Yichang/China, MUST Ulanbator/Mongolia, in partnership with EiABC Addis Ababa/Ethiopia

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ENERGIE-ARCHITEKTUR 2015

Department of Urban Renewable Energy University of Applied Sciences Technikum Wien









Campus II of UAS Technikum Wien







Passive houses Wolfurt, western Austria Architect: Gerhard Zweier

Heating demand < 15 kWh/m²a 3 panes glazing, 25 – 40 cm thermal Isolation Ventilation 80% heat recovery Solar and biomass heating system

Mr. Ball

Living estate Innsbruck, western Austria Architects: Baumschlager Eberle

300 flats in 6 buildings Heating demand 20 - 25 kWh/m²a Ventilation 80% heat recovery Heating system with 1000 m² solar paneels, decentral small heat pumps from exhaust air

3 panes glazing, 25 – 35 cm thermal Isolation Best green building worldwide Shangdi Moma Housing, Beijing/China Architects: Baumschlager Eberle

960 flats, low emission standard, highly insulated. Ceiling heating and cooling system, central ventilation with heat recovery.

High comfort requirements.

Hugo Boss – Central building for Italy and Swizzerland Chiasso/Italy Architect: Mattheo Thun, Milano

10000 m² office/design area Timber-concrete ceilings, light wood wall construction 3 panes glazing, fixed and moveable shading system Floor heating + cooling system Ventilation 80% heat recovery

High challenges on user comfort, ecology and image

Hugo Boss Zentrale Schweiz Chiasso/CH Omicron Development Center Klaus/Austria Architects: Nägele-Waibel-Ritsch

6000 m² highly flexible office area, wooden light weight facade, 3 panes glazing, fixed and moveable shading system Floor heating + cooling system Massive ceilings activated by ventilation, 80% heat recovery

Very high challenges on user comfort, such as 1500 lx or temperatures 22 – 24°C



Munich Reassurance Company Munich/Germany Architects: Baumschlager Eberle

10000 m² high level offices Refurbishmant in urban context 3 panes glazing, double facade with inbetween shading system U-Values 0.15 – 0,25 W/m²K Floor heating + cooling system Ventilation 80% heat recovery

High challenges on user comfort, ecology and image

Eberswalde regional government center, near Berlin/Germany Architects: GAP Berlin

27000 m², mainly offices New building in urban context 3 panes glazing, leight weight wood facade Special atria as climatic buffer zones "Gold" for energy efficient and ecological buildings in Germany Passive house international teachers and students home, Vienna Architects: P-ARC, Vienna

180 flats, new building in urban context3 panes glazing, high isolated concrete facadeHigh efficient ventilation system, preheating/-cooling via ground





















Energy demand per person worldwide

[kg oil equivalent/person]





Increase scenario



OECD = Organisation for Economic Cooperation and Development (Including 34 Countries: US, Australia, Japan, South Korea, some European Countries,.....)

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Electricity mix in %



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Coal power station Ulan Bator



Air pollution from coal firing, traffic and industry, Beijing



生态新城枚皋路大桥俯视效果图

Eco Cities, Green Cities, ... how will they behave in future?

How to build a new building?

How does the process go on?

How much may the building cost?

How long will it sustain?

How fast must the construction go on?

How much energy will it need, and how much comfort?

How to export well done building systems, is that possible?

How much energy does the building need?





How much energy does the building need?





How much comfort do we need?





Inner room temperature boundaries



The ENERGYbase International process



Mollier-diagram for Vienna

Mollier-diagram for Ulanbatur





Preliminary plans, if existing



• Storeys: 13

+68.50

+36.90

+33.30

+29.70

+26.10

+22.50

+18.90

+15.30

+11.70

+8.10

- Height: ~ 50 m
- Width: 27,8 m
- Length: ~ 34 m
- Size: ~ 10 000 m²



Optimizing energy, flexibility





Introducing a modular structure





Flexible HVAC





Modular electrical concept



Apply to the planned building



V2: jet nozzles, radiators





Introduction, ideas, concepts, ...

Tasks

- researching the history and progress of energetical architecture
- analyzing the ENERGYbase in Vienna (energy-architecture)
- analyzing the actual state of the University building in China (Mongolia)
- creating a new building form
- developing different modules to provide a mod system
- optimizing the building concerning energy efficiency conditions of use

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Discussion, team development, ...



... the young researchers team 2011/2012





Cooperation with professional planners and construction companies

Experienced building planners from Austria: Architects, building physics, HVAC, electrical planning, thermal building simulation

Experienced planners from the cooperation country

Construction companies from Austria and from the cooperation country



Design phase output examples

Süss Markus:

Development of an energy-efficient building concept with a modular HVAC system taking into consideration the Chinese Design Standard for Energy Efficiency of Public Buildings

Maul Lukas:

Development of an energy efficient, self regulating building concept with consideration of the Chinese Green Building Evaluation Standard

Supervisors: Muss Christoph, Li Yunjiang





The optimised ENETEC building

- Facade
- Ceiling-column construction
- HVAC system











Thermal simulation of the reference building

Hot week in summer(CW 26) - full operation

Temperatures within comfort zone









Thermal simulation of the optimized building

Hot week in summer(CW26)-



ENERGY|BASE Yichang 2012 ... -> 2015?



The team in Ulaanbaatar, Mongolia

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And best regards from Addis Abeba, Ethiopia, Africa.



Co - Teaching in Addis Ababa/Ethiopia



The team in Addis Ababa, Ethiopia 2015



... working on future projects with young researchers for the future generation.

It's exciting, let's do it!





Thank you for your attention!

Muss Christoph

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