EnEFF Campus
Research Project Presentation

Institute of Building Services and Energy Design
Univ. Prof. Dr.-Ing. M. Norbert Fisch

ISCN-GULF Conference 2011
08th-10th of June 2011, Göteborg
Founded in 1745

Germany’s oldest institute of technology

Academic tradition combined with state-of-the-art teaching methods and facilities.

Excellent connections to a wide variety of partners in industry and research.

Faculty of Architecture, Civil Engineering and Environmental Sciences

45 institutes providing an interdisciplinary profile
IGS - Institute of Building Services and Energy Design

Technische Universität Braunschweig

Faculty of

- Architecture
- Civil Engineering
- Environmental Sciences

Department of Architecture

Five core disciplines:

A History and Theory of Architecture
B Illustration and Design
C Construction and Building Techniques
D Design and Planning:
   Urban and Landscape Planning
E Design and Planning of Buildings

IGS

Univ. Prof. Dr.-Ing. M. Norbert Fisch

About 30 engineers from the fields of
- Architecture
- Civil engineering
- Mechanical engineering
working in interdisciplinary research teams
Research and Project Work at IGS
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Project Aims

- Energetical optimisation of campus grounds as urban quarters
- Meeting the Federal Government’s climate protection goals for 2020 (-20% CO₂) in 2016
- Duplication of the climate protection goals for 2020, meeting -40 % CO₂
- Phase 1: Masterplan - concept and costs

Funding phase 1 (planning)

- External funding by the Federal Ministry of Economics and Technology
- Internal funding through:
  - staff costs of the institutes
  - investments from the Facility Management of the TU
Background

- German Federal Government's climate-protection targets (2020: -20% CO₂ / 2040: -40% CO₂)
- Programme 'Educational Republic of Germany'
- Investment deficit in the area of university building construction

Research Programmes

- BMBF*-competition „Energy-efficient City“
- BMWi*-research field „EnEff Stadt“
  www.eneff-stadt.info

* BMBF - Federal Ministry of Education and Research
* BMWi - Federal Ministry of Economics and Technology
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Project Partners

- TUBS university’s executive board
- IGS - Institute of Building Services and Energy Design
  Univ. Prof. Dr.-Ing. M. N. Fisch
- ISL – Institute for Urban and Landscape Planning
  Univ. Prof. U. Brederlau
- IfP – Institute of Psychology
  Univ. Prof. Dr. S. Kauffeld
- GB3 – University Facility Management
  Dr. C. Brinsa

Cooperation with

- HIS GmbH (University Development and Communication)
- HBK (ITD – Institut of Transportation Design, Prof. Rammler, Mobility)
- synavision GmbH (Monitoring and Communication)
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Research Focus

1. Urban planning, architecture, building technology
2. Energy supply
3. Construction and facility management
4. Mobility
5. User behaviour
6. University's executive board / administration

Work and Time Schedule

- Planning: 2011-2013 (basic research, masterplan)
- Realisation: 2014-2017 (construction, operation, organisation …)
- Monitoring: 2018-2020 (techn./econ./social evaluation, documentation)
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Research Focus 1: Urban planning, architecture, building technology

- Development concept for the Campus
- Architecture, urban planning, protection of historic buildings
- Integrated concepts for new construction, renovation and dismantling
- Minimal-invasive renovation concepts (without vacation)
- High overall energy-efficiency of the buildings
- Innovative technologies and concepts (demand-adapted ventilation, LED-lighting, Thin Clients/Green IT etc.)
- High-quality, performance-enhancing learning environment
- Flexibility and infrastructural capability
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Research Focus 2: Energy Supply

- Decentral energy generation/heat-power cogeneration.
- Small to medium-sized supply concepts
- Integration of renewable energies
- Virtual power plants
- Intelligent electricity networks: demand-/load-management, electricity storage
- Integration of e-mobility as electricity storage
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Research Focus 3: Construction and Facility Management

- Strategical campus planning (demographic tendencies, university development)
- Auditing and administration of inventory data
- Methods and strategies for building evaluation
- Energetic quality assurance
- Energy management systems
- Application of innovative Information and communication technologies zur for operation control and optimisation
- Innovative operator models and services
Research Focus 4: Mobility

- Traffic avoidance by virtualisation of research and teaching
- Traffic avoidance by social services for living and studying (e.g. child care)
- Services for pedestrian and bike traffic
- Integration of public transport
- Integration of e-mobility on the Campus and the energy-supply concept
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Research Focus 5: User Behaviour

- Interactive media concepts for communication of real-time user-specific energy consumption and costs
- Internal user-consumption-adapted invoicing concepts for energy costs (participation models)
- Enhancing the transparency of energy consumption and the consciousness about energy-efficiency among students and staff
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Research Focus 6: University's Executive Board / Administration

- “EnOB-Mission Statement/Branding” as central goal of the executive board
- Overall economic perspective of building stock and energy consumption
  (demographical tendencies, development of number of students qualifying for university entrance, university development plan)
- Financial structure and planning
- Division of responsibilities between university and state
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Research and Teaching Laboratory

- Integral demonstration projects together with innovative communication concepts
- Energy and sustainability as central teaching focus in all faculties
- Development of interdisciplinary projects between the faculties
- Increase of e-learning
- Establishment of virtual technical or environmental/sociological „simulation- and monitoring-platforms“ or practical „construction laboratories“
- Promotion of the appeal of studying and working in the field of energy-efficient planning, building and operating
- Interconnect practical and academical teaching and working methods
- Development of formats for transfer and multiplication
  - in local urban environments
  - in between universities nationally/ internationally
- ...
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Timeline

Basis for the funding concept EnEFF Campus

Main issue EnEFF Campus

2011  |  2012  |  2013  |  2014  |  2015  |  2018

Basic research, pilot project TU Braunschweig and communication

HIS

Analysis and documentation

Guideline EnEFF Campus

Demo 1

Planning  |  Realisation  |  Monitoring

Demo 2

Planning  |  Realisation  |  Monitoring

Demo …

Planning  |  Realisation  |  Monitoring

Research and Development

Laufendebeantragt: FH München, RWTH Aachen, Uni Saarland …