

# Urban Research at KIT: A Contribution to Sustainable Urban Development

More than half of the world's population is currently living in urban areas and this proportion is increasing continuously. In the 21st century, cities are challenged by globalization, increasing complexity and interlinkage of infrastructures, scarcity of resources, environmental pollution, climate change, and demographic change.

Research at KIT contributes to the investigation, development, and design of the city of the future in all essential aspects. With a unique combination of expertise in natural sciences, engineering, social sciences, humanities as well as planning and design, KIT researchers investigate all functional and life areas of a city using a holistic approach. KIT provides knowledge for sustainable urban development to stakeholders and policy makers on a local, regional, national, and international level. KIT researchers have identified six challenges for urban areas, to the solution of which contributions are made.

## AMBITION

- Integrated urban governance: Combine perspectives of different stakeholders
- Holistic and interdisciplinary scenarios for districts, cities and regions

## KIT APPROACH

- Technology assessment and systems analysis: Embedding **technologies in a social context**
- Analysis of **governance** structures and mechanisms
- Sustainability** analysis and assessment
- Development of eligible operational **strategies**
- Moderation of **participation** processes
- New **cooperation** and **financing** models



## AMBITION

- Development of a sustainable city: Adapting structure and image
- Holistic and integrative planning and design

## KIT APPROACH

- Architecture**, urban planning and development
- Integral concepts of **technological, economic, social, usage and design** aspects
- Development, application and evaluation of **planning** methods and planning devices
- Virtual engineering** – virtual city models
- Cooperation** with urban planning authorities
- Connecting **participation** processes and planning procedures



Air quality in the megacity of Beijing needs to be improved

## AMBITION

- Measuring and improving the quality of life
- Better understanding of ecologic, economic and social complexity and dynamics
- Protection against hazardous environmental pollution

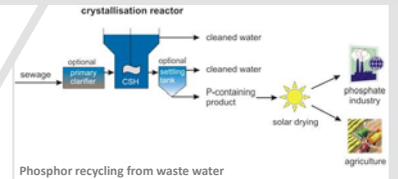
Aerodynamics and distribution of pollutants in urban areas



## KIT APPROACH

- Investigating **urban ecology** and assessing **ecosystem services**
- Measuring, modeling and analyzing **environmental pollution** (air quality, water quality and soil quality)
- Determination of **well-being** and desiderata
- Investigating **demographic change**, migration and multi-locality

Multi-local living: the interplay between situatedness and movement



## QUALITY OF LIFE

Assess, preserve and ameliorate

## URBAN SYSTEM

Analyze, finance and control



# URBAN RESEARCH at KIT

## RESOURCES

Efficient and sustainable use



## AMBITION

- Efficient urban material and energy flows
- Resource-efficient buildings
- Integrated Water Resources Management

## KIT APPROACH

- Modeling, simulation, monitoring, balance study and analysis of **material and energy flow**
- Integral concepts for **resource efficiency** in urban areas and usage of **renewable energies** in buildings
- Development of efficient **building materials**
- Building **Lifecycle Management**
- Integrated urban **water management**



## PLAN and DESIGN

the city



## INFRA-STRUCTURES

Developing and connecting



## RISKS

Strengthen the city in handling

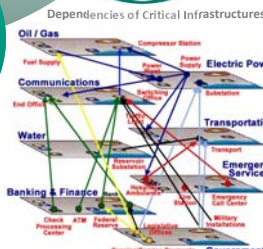


## AMBITION

- Strategies for adaptation and mitigation
- Impact minimization
- Improvement of resilience

## KIT APPROACH

- Forensic disaster analysis:** Natural hazards affecting technical infrastructures and societal structures
- Development of **technologies** for disaster prevention, reduction and management
- Risk analysis of **critical infrastructures**
- Investigation of **regional climate change**
- Analysis and development of **adaptation strategies, resilience and vulnerability** observation



## AMBITION

- "Smart City" – Scrutinizing, crosslinking and improving infrastructures
- Adaptive infrastructures

## KIT APPROACH

- Monitoring, simulation, regulation and **optimization of infrastructures**
- Mobility systems** analysis and development
- Travel behavior** analysis and **traffic simulation**
- Smart Grids, Smart Home, Smart Traffic, Smart Data**
- Electricity, gas, and **ICT networks and security**

