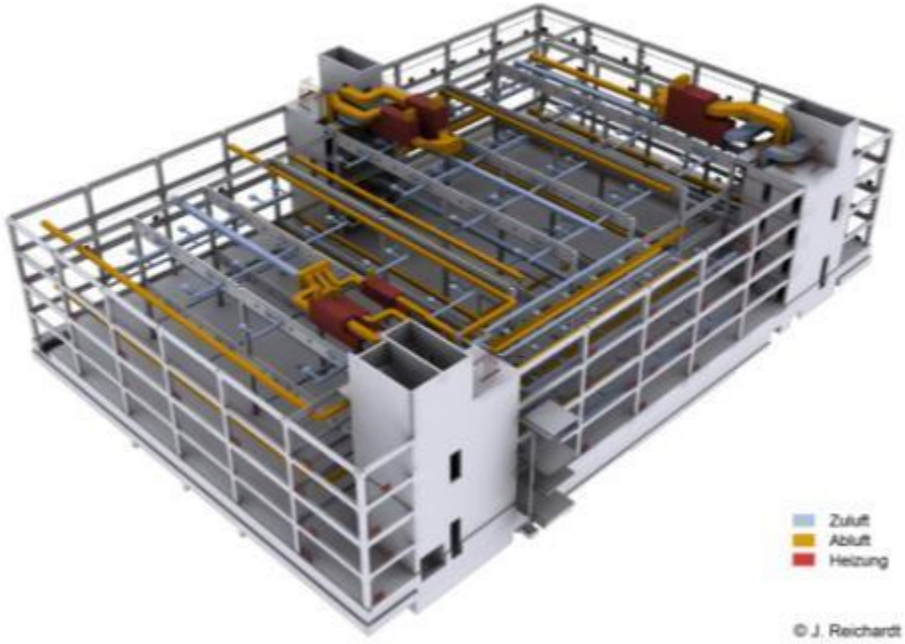
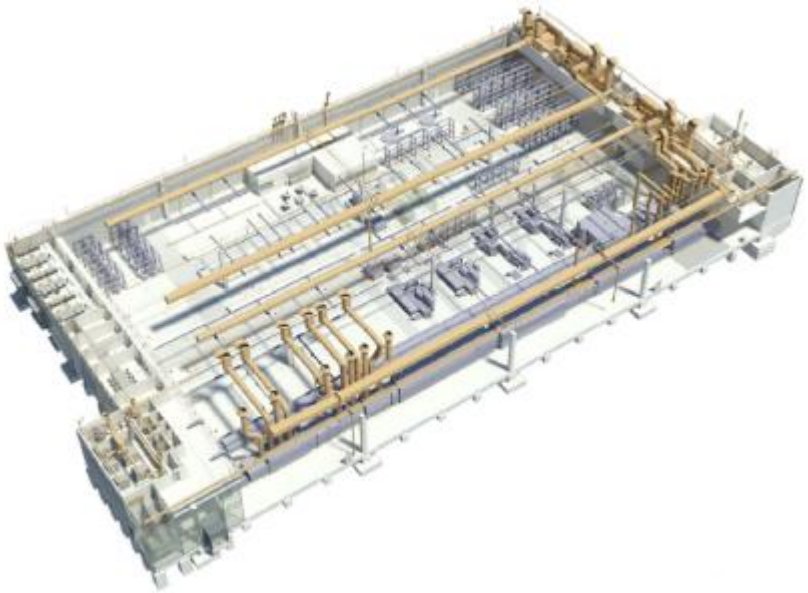
„Aspekte einer holistischen Grammatik des nachhaltigen Bauens“
Prof. Jürgen Reichardt, MSA, Muenster School of Architecture, Essen

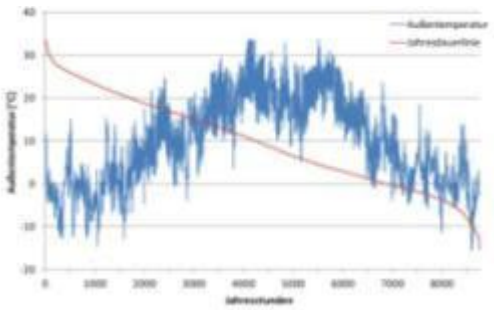
- Case Studies digitale Planung BIM, BEM, BSM, Potentialanalyse
- Urbane Wärmeinseln und Stadbegrünung
- Internationale Forschungsnetzwerke, Wissensportal Climatehub.online
- Potentiale für Essen, Projekte MSA Urban Farming, 2nd Life Grugabad

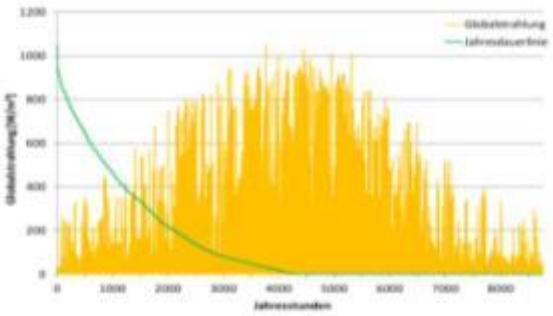




Case Studies BIM, BEM, BSM

BIM, Building Information Modeling: Sterling Madrid, Sennheiser Hannover, Modine Budapest, Wackersdorf (RMA)



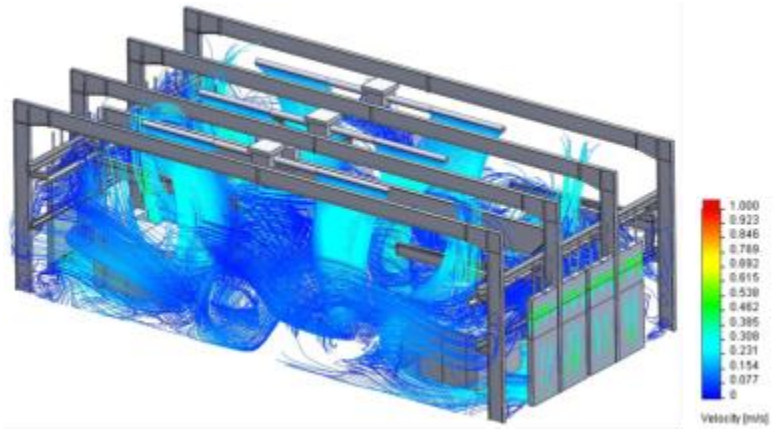


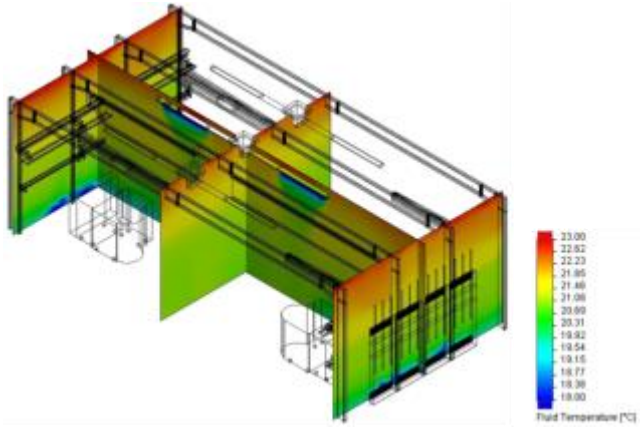
Case Studies BIM, BEM, BSM

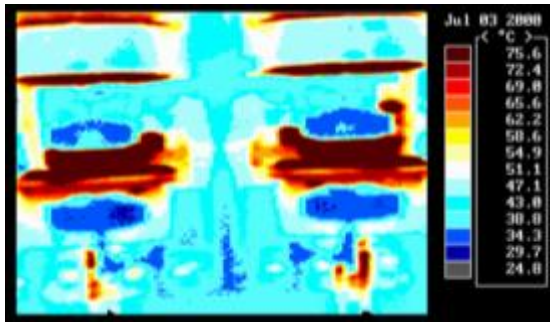
BIM, Building Information Modeling: Uhrenmanufaktur Schaffhausen, CH (RMA)

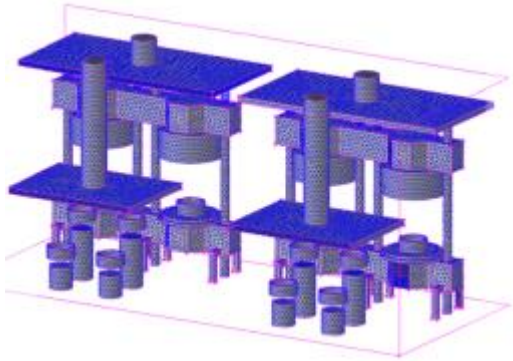
Notes: *Energy intensity* is final energy used per unit of floor area. *Appliances and other* includes household appliances (e.g. refrigerators, washers and televisions), smaller plug loads (e.g. laptops, phones and other electronic devices) and other service equipment.

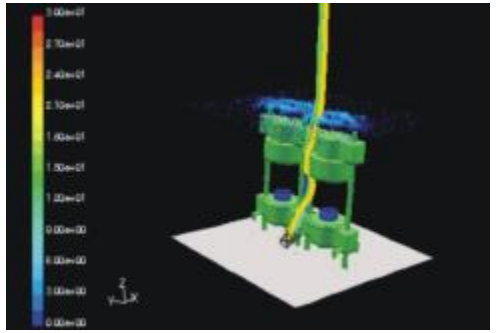
Sources: Adapted from IEA (2019a), *World Energy Statistics and Balances* (database), www.iea.org/statistics and IEA (2019b), *Energy Technology Perspectives*, buildings model, www.iea.org/buildings.

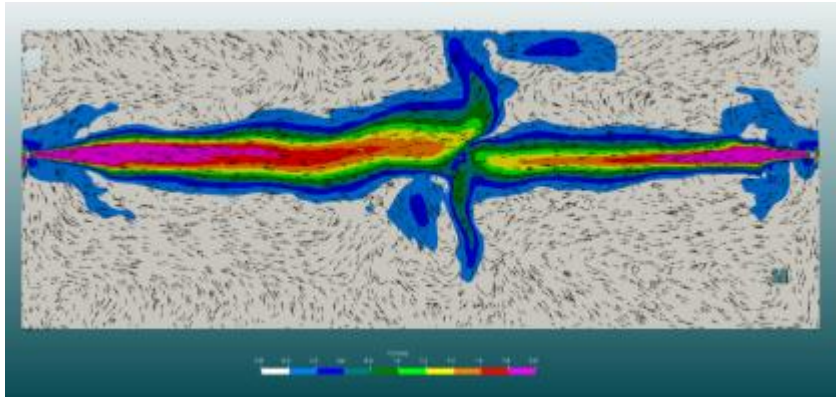


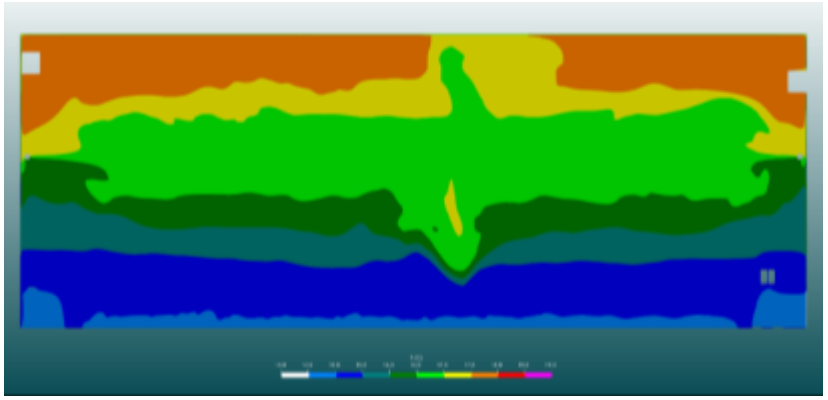












Case Studies BIM, BEM, BSM

BEM, Building Energy Modeling: CFD Analyse Feinmechanik, Schokoladenlager; Thermografie Reifenprozess (RMA)

A Site

1 Geothermical Heat
2 Photovoltaic Facilities
3 Wind

B Building

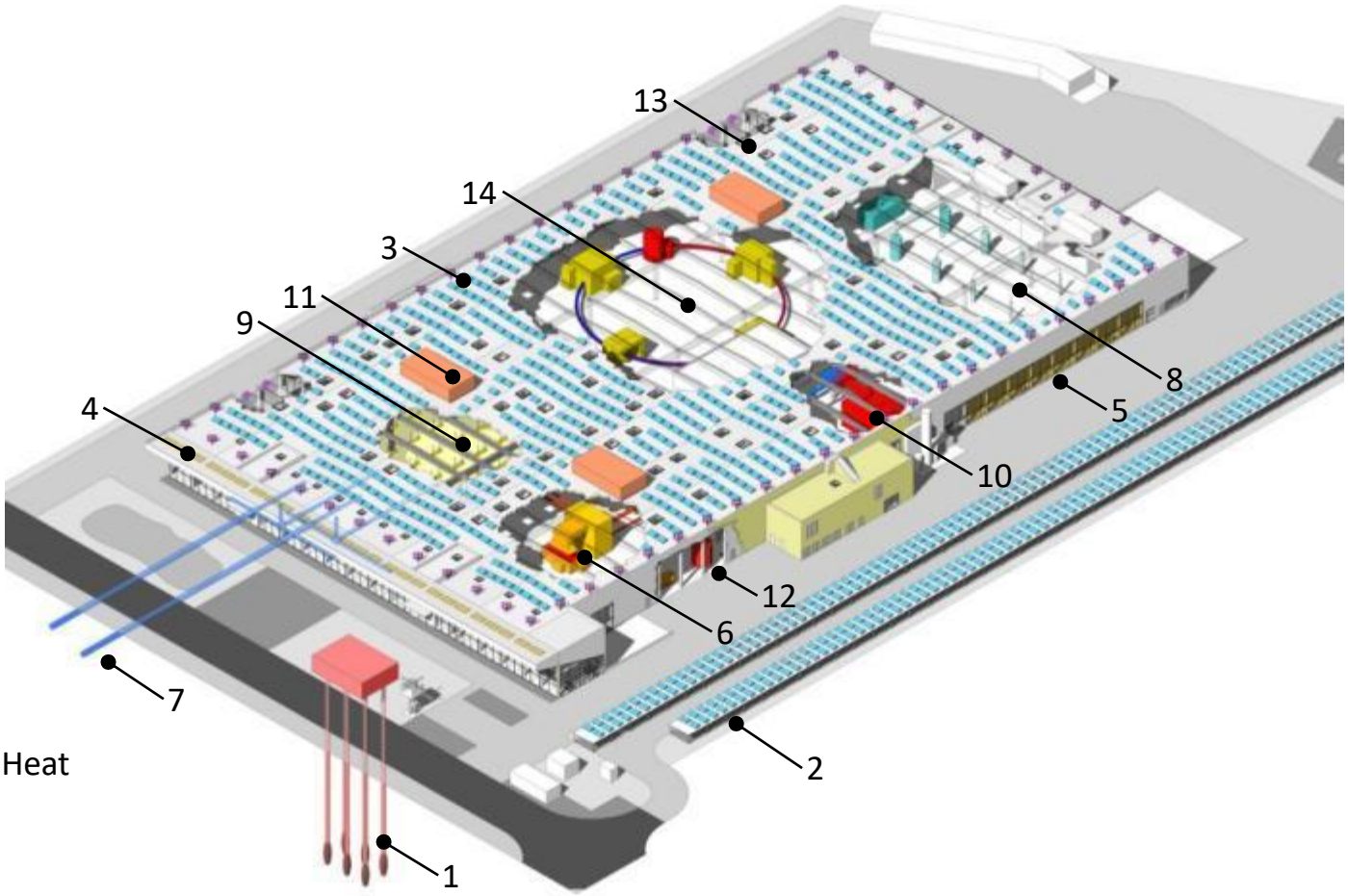
4 Steering of Daylight
5 Daylight Openings

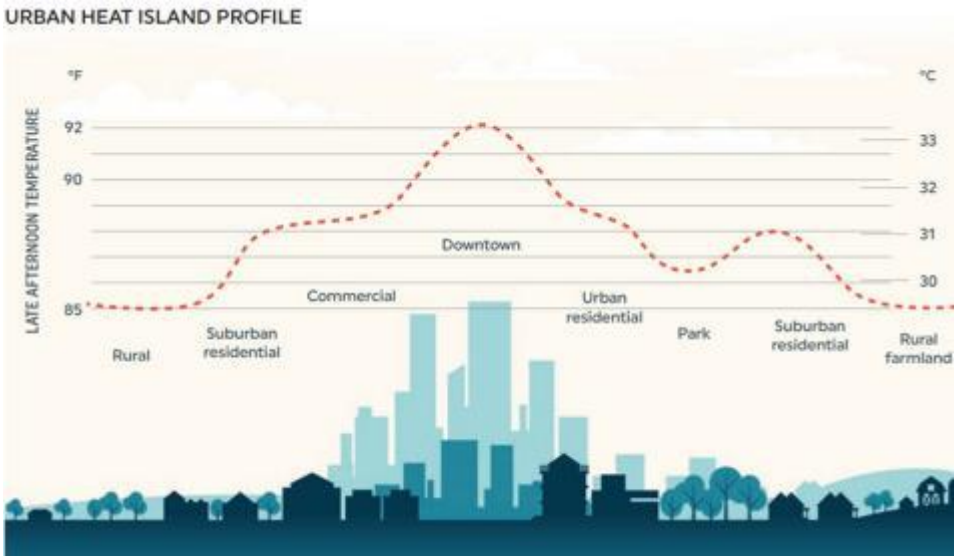
B Process

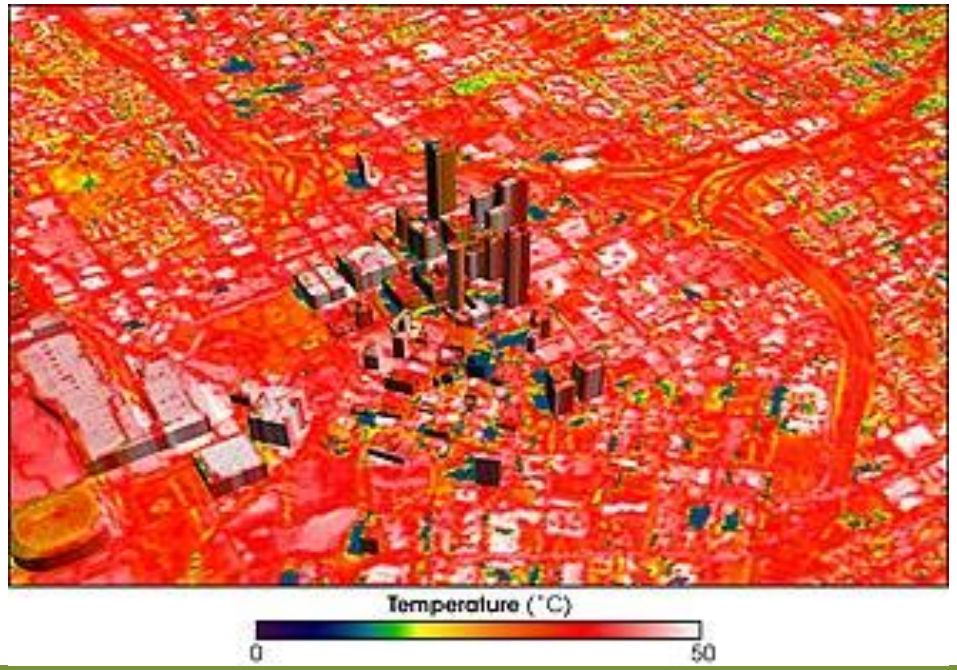
6 Process Heat

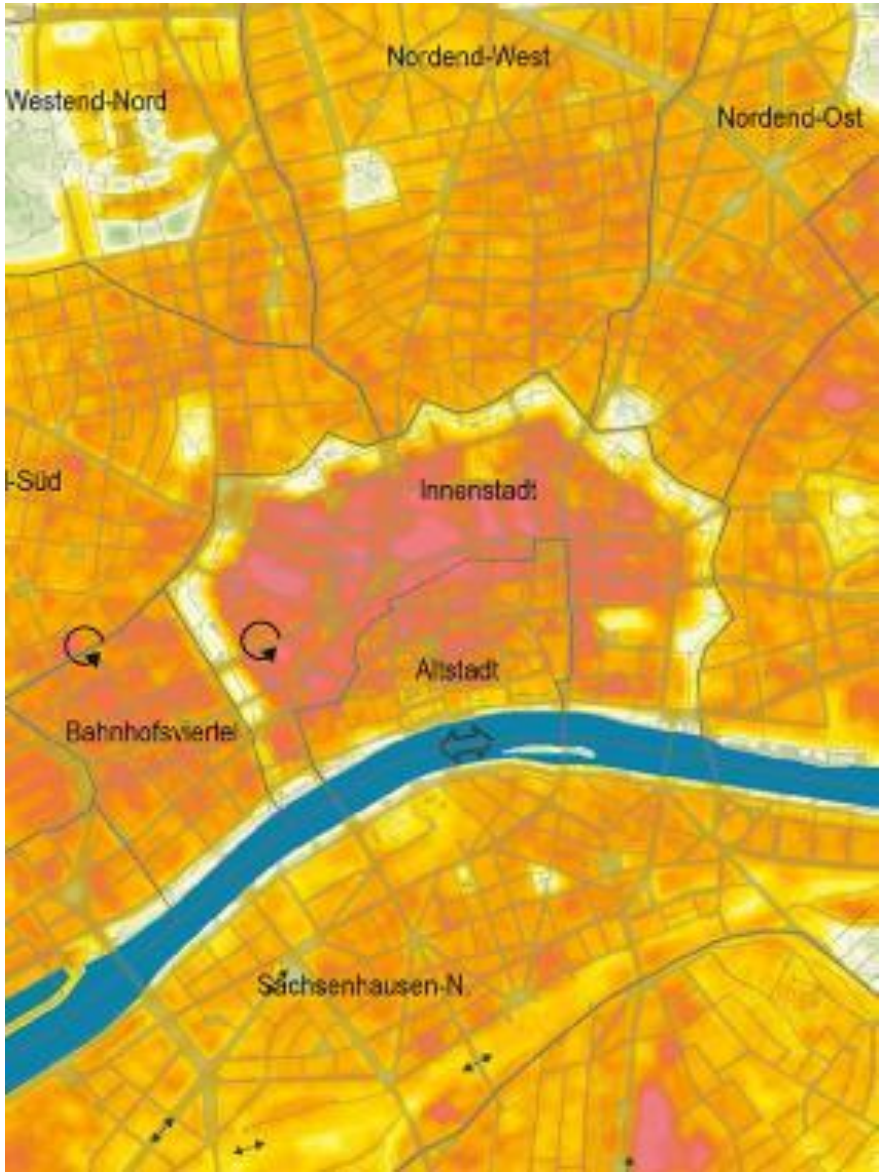
D Utilities

7 Main Systems
8 Pressure Air
9 Electrical Transformers
10 Coupling of Power and Heat
11 Mechanical Ventilation
12 Fresh Water
13 Ventilation
14 Circulat Hear



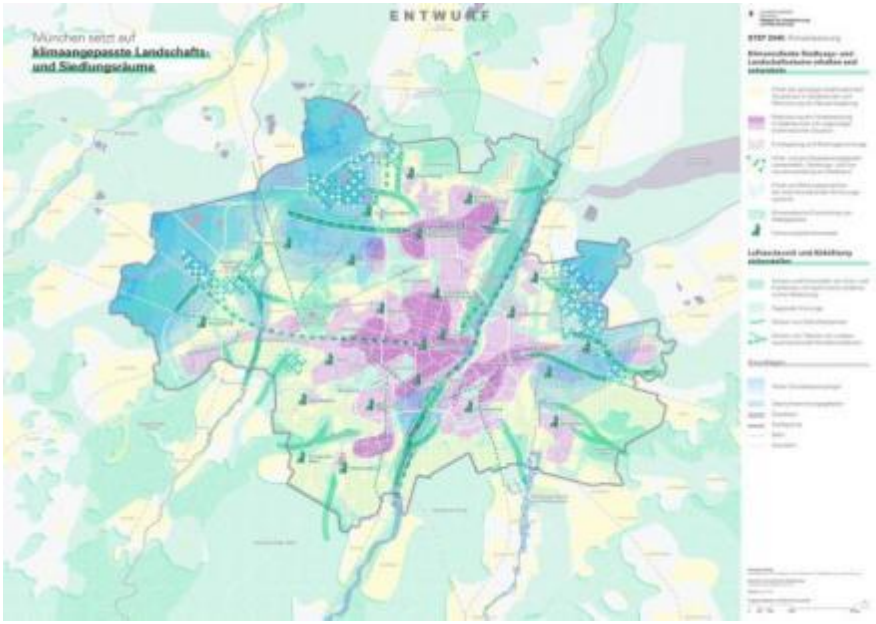






Urbane Wärmeinseln und Stadtbegrünung

Stadt/ Umland Temperaturgefälle, BIM/ BEM Stadtmodell, Klimakarte Frankfurt/ Main (Klima-Energie-Portal, ULI)



Urbane Wärmeinseln und Stadtbegrünung

Klimakarte München 2040; WBW/ Preisgericht 60 ha Urbane Produktion BMW, München (MUCBOOK, BMW)

Die grüne Stadt über der Stadt

Lebensraum ist in den überfüllten Metropolen knapp. In Rotterdam sollen deshalb Hausdächer besser genutzt werden

Über den Dächern von Rotterdam: Die niederländische Hafenstadt setzt für ihre Zukunft auf die Höhen. Koen Van Weel AFP

Rotterdam Wer die Zukunft der Stadt entdecken möchte, muss schwindelfrei sein: Er knapp 30 Metern Höhe verbindet ein Steg das Rotterdamer World Trade Center mit einem Kaufhausdach. Er ist Teil eines Rundgangs in lufliger Höhe über der niederländischen Hafenstadt, der zeigen will, welche Möglichkeiten Flachdächer bieten. Denn wer in einer Großstadt leben will, muss heutzutage noch viele Abstriche machen, was ausreichend Platz zum Wohnen und Leben anbelangt. Da liegt es auf der Hand, jeden Quadratzentimeter freie Fläche für eine Nutzung zu überdenken – auch in schwindelerregenden Höhen.

Urbane Wärmeinseln und Stadtbegrünung

Ansätze Green Cities: Auroville, Singapore, Paris, Rotterdam

Special Issue "Sustainable Design under Climate Responsive Environments"

- Special Issue Editors
- Special Issue Information
- Keywords
- Published Papers

A special issue of ***Applied Sciences*** (ISSN 2076-3417). This special issue belongs to the section "Civil Engineering".

Deadline for manuscript submissions: **20 June 2022**.

Share This Special Issue

Special Issue Editor

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E-Mail Website1 Website2 **SciProfiles**
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Interests: 3D-BIM Revit modeling; dynamic climate analysis; energy efficiency; sustainability; changeability; factory planning; steel structures; programming
Special Issues, Collections and Topics in MDPI journals

Special Issue Information

Dear Colleagues,

As the world grapples with a growing climate crisis, our academic research must focus on reducing the carbon footprint of buildings and mitigating ecosystem biodiversity disturbances. Due to the worldwide global warming, an increasing number of hazardous environmental disasters are taking place, caused by the human misunderstanding of the interactions of climate, nature, and buildings. Destroying new and retrofitting existing environments, and irretrievably destroying nature flora and fauna species biodiversity in the process, should no longer be the focus of short-sighted and mainly profit-oriented development. Traditional linear thinking will have to be replaced by more multidisciplinary team-oriented approaches, combining expertise in climate, ecology, biodiversity, energy efficiency, carbon footprint, as well as sociology and culture, to favor locally beneficial holistic environmental designs.

Such approaches must be grounded in an extensive comprehension of the precious heritage of specific cultures and sociology, coinciding with the small carbon footprints of "low-technology", less industrialized 3rd-world countries, as well as the responsibilities of countries with "high technological" carbon footprints, such as Germany. Hence, an integral blending of these partly diametral experiences, technologies, and ecological and sociological issues could be very favorable for developing more holistic strategies toward more resilient, climate-responsive environments.

You may choose the Related Special Issue "Novel Concept and Technologies of Sustainable Building Design" in ***Applied Sciences***.

Prof. Jürgen Reichardt
Guest Editor

Manuscript Submission Information

Manuscripts should be submitted online at www.mdpi.com by registering and logging in to this website. Once you are registered, click here to go to the submission form. Manuscripts can be submitted until the deadline. All submissions that pass pre-check are peer-reviewed. Accepted papers will be published continuously in the journal (as soon as accepted) and will be listed together on the special issue website. Research articles, review

Informationen zu Sonderausgaben

Liebe Kolleginnen und Kollegen,
Während die Welt mit einer wachsenden Klimakrise zu kämpfen hat, muss sich unsere akademische Forschung darauf konzentrieren, den CO2-Fußabdruck von Gebäuden zu reduzieren und Störungen der Biodiversität von Ökosystemen zu mindern. Aufgrund der weltweiten Erderwärmung ereignen sich immer mehr gefährliche Umweltkatastrophen, verursacht durch das menschliche Missverständnis der Wechselwirkungen von Klima, Natur und Gebäuden. Die Zerstörung neuer und die Nachrüstung bestehender Lebensräume und damit die unwiederbringliche Zerstörung der Artenvielfalt der Natur, Flora und Fauna, darf nicht länger im Fokus einer kurzsichtigen und überwiegend profitorientierten Entwicklung stehen. Traditionelles lineares Denken muss durch multidisziplinäre, teamorientierte Ansätze ersetzt werden, die Expertise in den Bereichen Klima, Ökologie, Biodiversität, Energieeffizienz, CO2-Fußabdruck sowie Soziologie und Kultur kombinieren.
Solche Ansätze müssen auf einem umfassenden Verständnis des wertvollen Erbes spezifischer Kulturen und Soziologien beruhen, das mit den geringen CO2-Fußabdrücken von „niedrigtechnologischen", weniger industrialisierten Ländern der Dritten Welt sowie der Verantwortung von Ländern mit „hochtechnologischem" Charakter zusammenfällt " CO2-Fußabdruck, wie Deutschland. Daher könnte eine integrale Mischung dieser teilweise diametralen Erfahrungen, Technologien und ökologischen und soziologischen Fragen sehr günstig sein, um ganzheitlichere Strategien für widerstandsfähigere, klimaverträglichere Umgebungen zu entwickeln.

Im Bereich Angewandte Wissenschaften können Sie das zugehörige Sonderheft „ **Neuartige Konzepte und Technologien nachhaltiger Gebäudeplanung** " wählen .

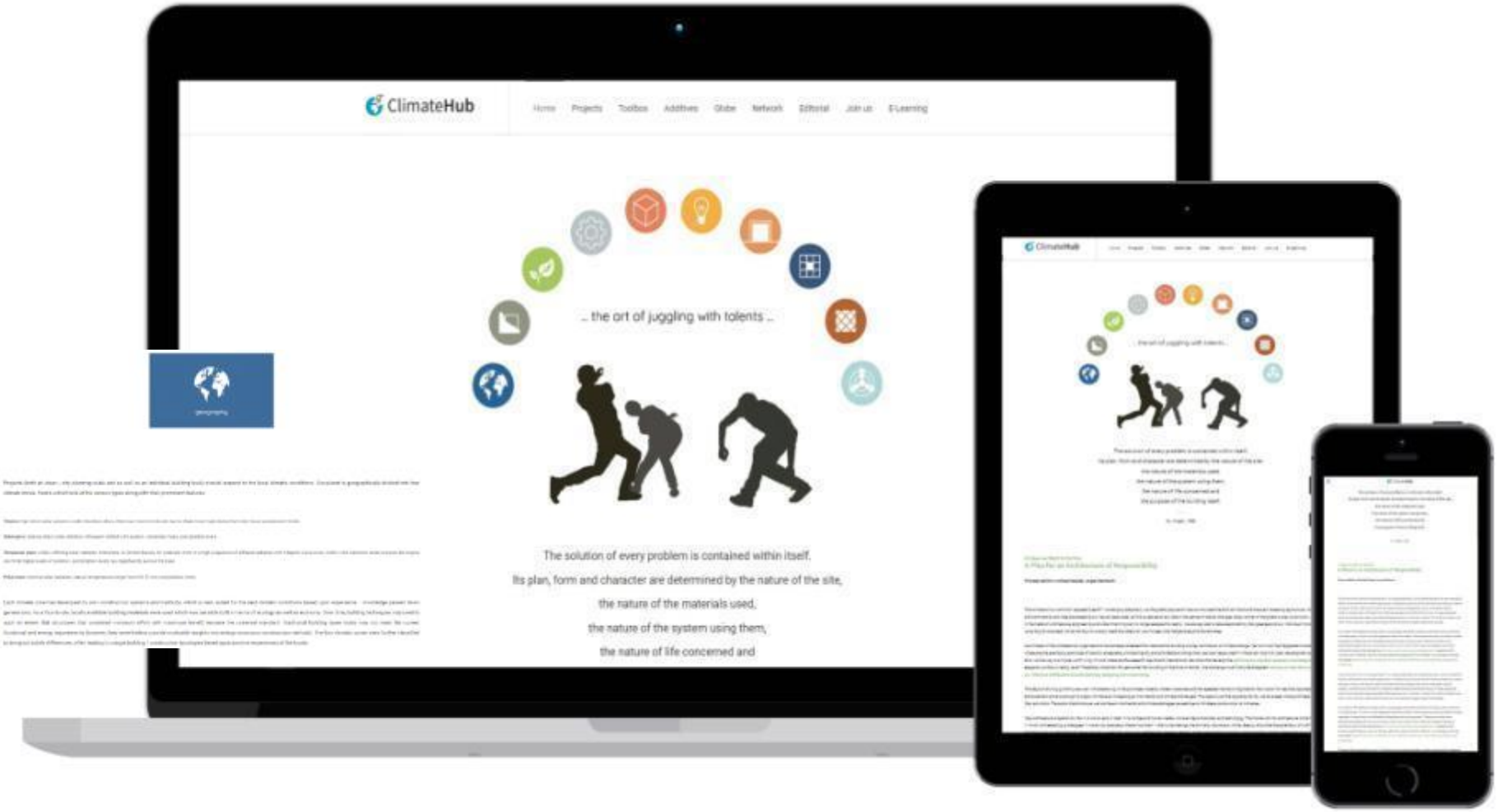
Prof. Jürgen Reichardt
Gastherausgeber

Schlüsselwörter

- ökologischer Fußabdruck
- ökologischer CO2-Fußabdruck
- Schutz der Biodiversität
- Aufbau von Retrofit-Strategien
- Resilienzstrategien für Umwelt und Landschaft
- Minderung von Ressourcenverschwendung/Oberflächenversiegelung/Umweltzerstörung
- urbaner Bergbau
- Abfallrecycling

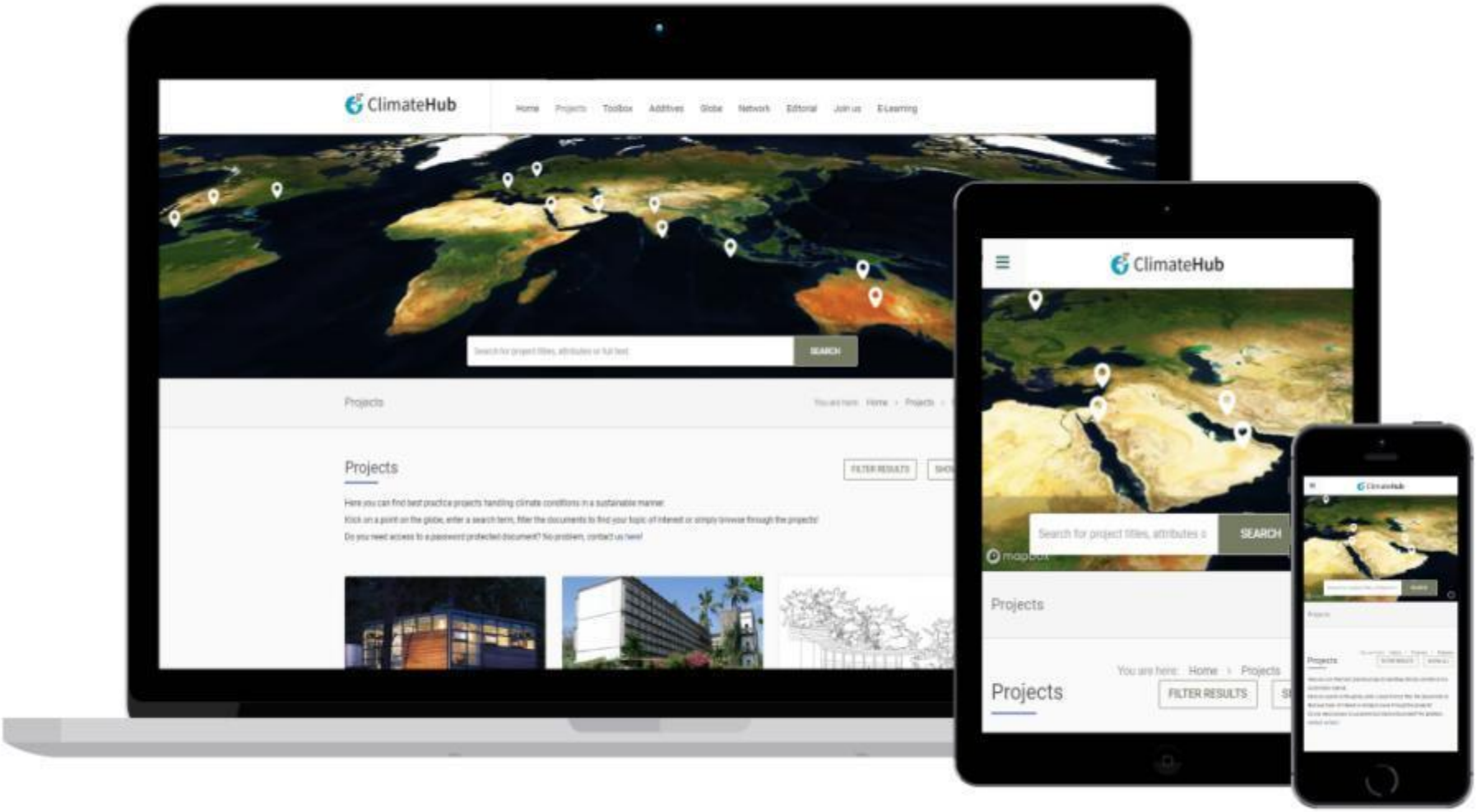
Internationale Forschungsnetzwerke

Applied Sciences, MDPI, Elsevier; Peer Group Paper Reviews (Reichardt)



Internationale Forschungsnetzwerke, Wissens- und Lernportal

www.climatehub.online (Reichardt)

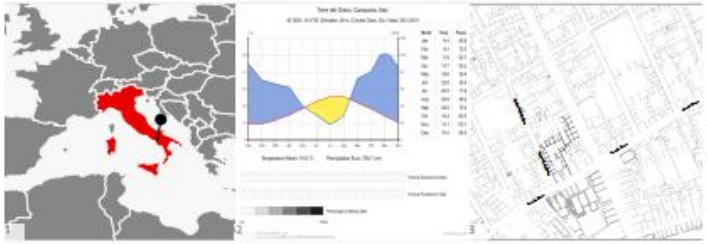


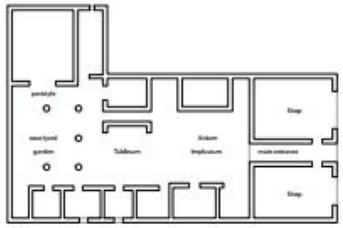
Internationale Forschungsnetzwerke, Wissens- und Lernportal

www.climatehub.online

Roman Atrium Villa

House of the tragic poet | Pompeii, Italy | mediterranean | Lat. 40°45'0" N, 14°29'10" E
unknown architect





Floor plan/ Section Zoning
Due to the preservation of living and furnishing objects, as well as Vitruvius's writings on the typology of the Roman townhouse [12], the following functions can be assigned to the rooms of the building (see Figure 6).
Next to the central entrance in the south of the house, along the main street Via delle Terme, there were small shops. They also served as a buffer zone to protect the living areas inside from the heat radiation of the exposed street as well as the higher noise level. The strategy in the arrangement of the rooms quickly becomes clear: from the entrance, a sequence of rooms aligns from the atrium, tablinum and peristyle to the garden. These day rooms derive the most benefit from convection currents. Functional and private spaces arrange themselves to the side of this zone to benefit from the convection currents.

First Light House

Waimärama | New Zealand
Tobias Danielmeier . Solar Decthlon Team New Zealand

A "Grammar" of

10

Climate

Responsive

Architecture

Parameters

Editoring Team Prof. Juergen Reichardt, MSA Muenster School of Architecture,
with Marius Kloepper M. A., Jan Goldbach M. A., Ilka Drixelius M. A.,
Lara Eiff, Julian Wessels, Anna Oxon M. A., Alexander Niehaves M. A., Nethmi Jayaratne B. Arch.

needed for reasons of hygiene and oxygen requirement.

- The removal of internal humidity too, demands a certain degree of ventilation because mold growth has to be avoided.
- In assembly areas (e.g. schools, meeting halls, etc) it is almost impossible to keep the internal air cooler than the external, other than for short periods. When the bodily heat output exceeds the rate of heat absorption by the building fabric, the air temperature increases. When it reaches the outside air temperature, further rises can be avoided by ample ventilation. [...]" [(1) p. 18 l.5-8 p.19]

Placement of openings

"The location of openings may create a deflection of the indoor air circulation. When the opening is placed asymmetrically in a facade, unequal pressure on both sides of the opening influences the airflow. This effect can be observed in the horizontal direction when a window is not centred in the plan." [(1) p.21 l. 5-8]

Cross-ventilation

"This is a particularly valuable means of cooling during warm periods because it not only removes heat from the space but also increases the sensation of cooling by increasing people's rate of evaporation. However, in hot climates and in warm summer mixed climates at night, air movement is frequently slow, in which case stack-ventilation becomes an important supplementary strategy. Combined strategies may also be employed for different rooms in the same building. For example, cross-ventilation might be used in windward side and upper level rooms, while stack-ventilation might be used in lee side and lower rooms that have less access to wind. Charles Correa avoided the problem of wind-blocking internal corridors in the Kanchunjunga Apartments Bombay, India, with the use of vertical circulation cores serving
two units per floor. This allows ventilation air to move from one side of the building to another by flowing around the cores." [(1) p.23]

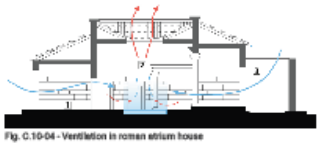


Fig. C.10-04 - Ventilation in roman atrium house

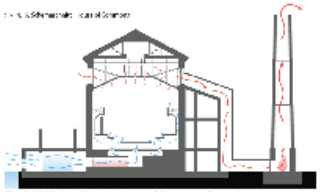


Fig. C.10-05 - Ventilation in House of Commons, England

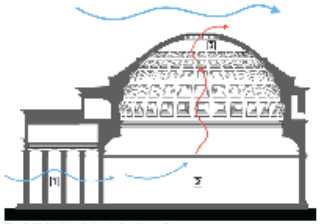


Fig. C.10-06 - Ventilation in Pantheon, Rome

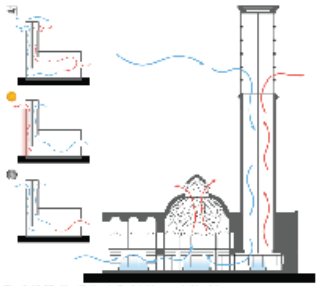
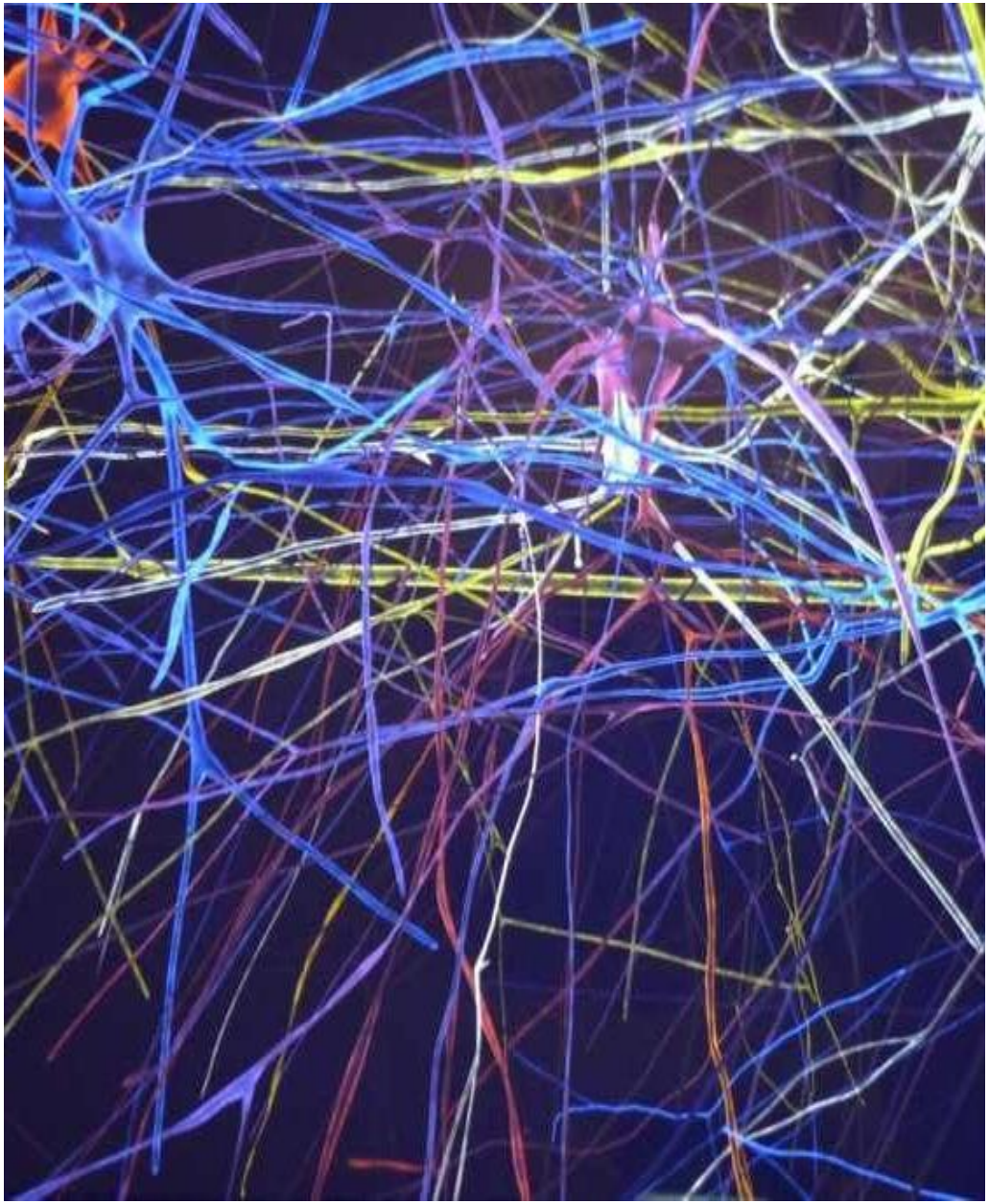
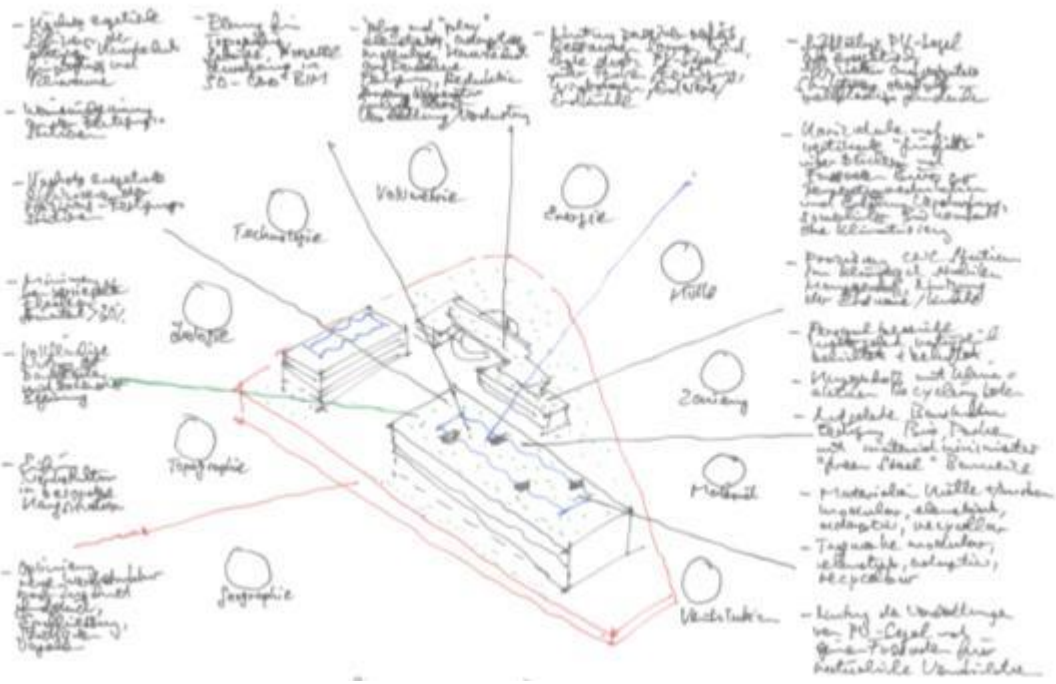


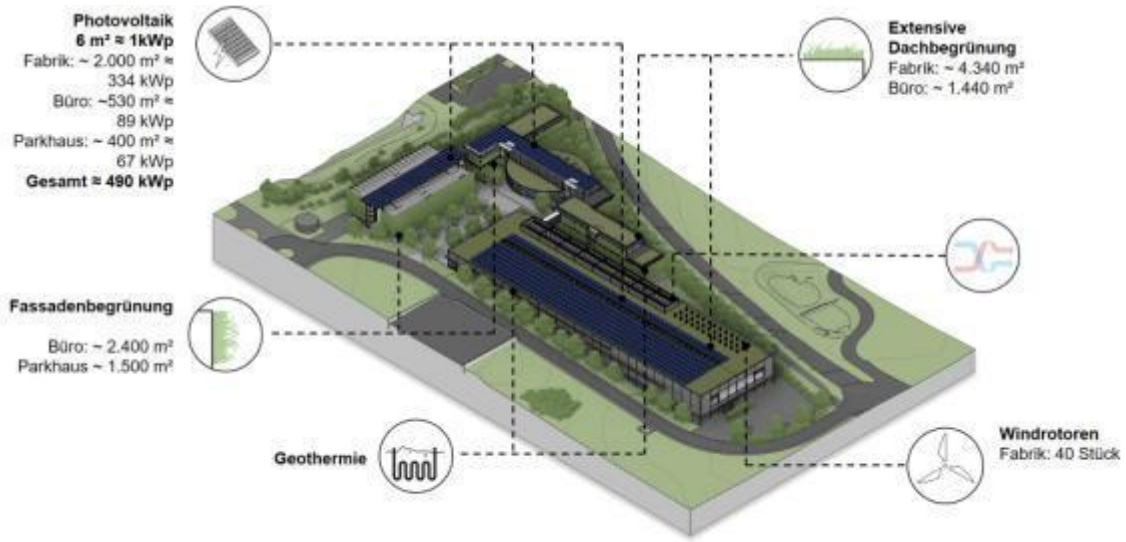
Fig. C.10-07 - Ventilation in Badgir-Houses in Yazd, Iran



Passiv/ Aktiv, Exkurs:

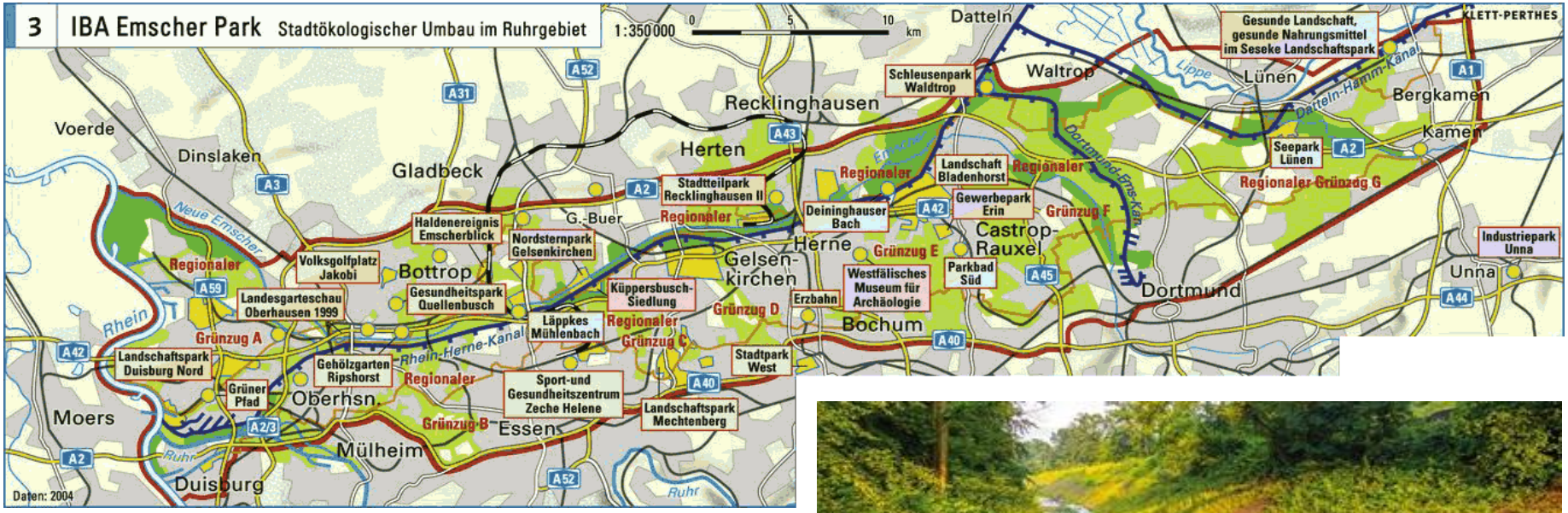
Le Memoire Du Vent, Bernard Moninot, Vernetzung, Synapsen





Potentialnalysen Energie, Klima

Programming nach Methodik 10 Grammar points, case study Kugellagerfabrik (RMA)



KLIMA INITIATIVE ESSEN

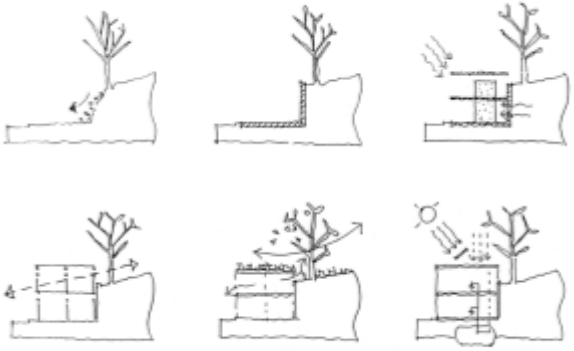
Handeln in einer neuen Klimakultur

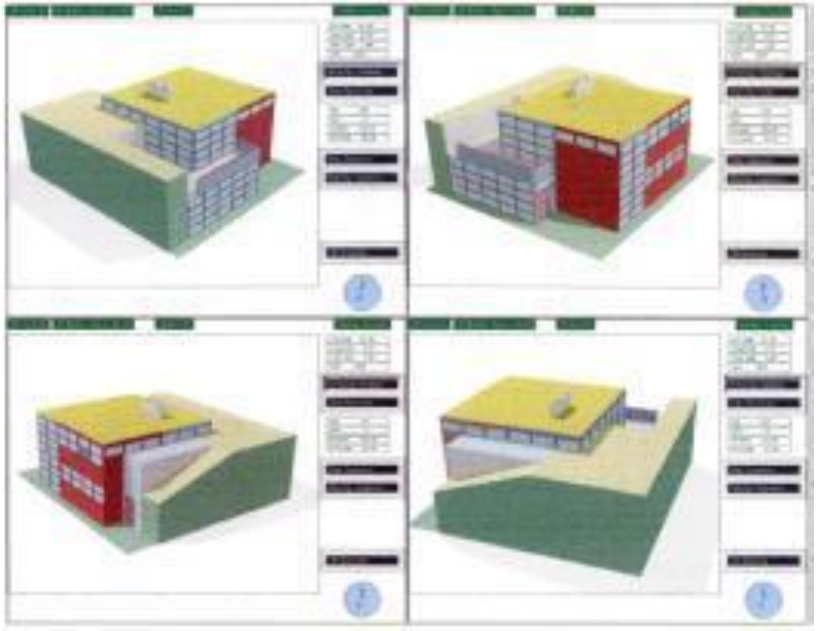
Potentiale für Essen

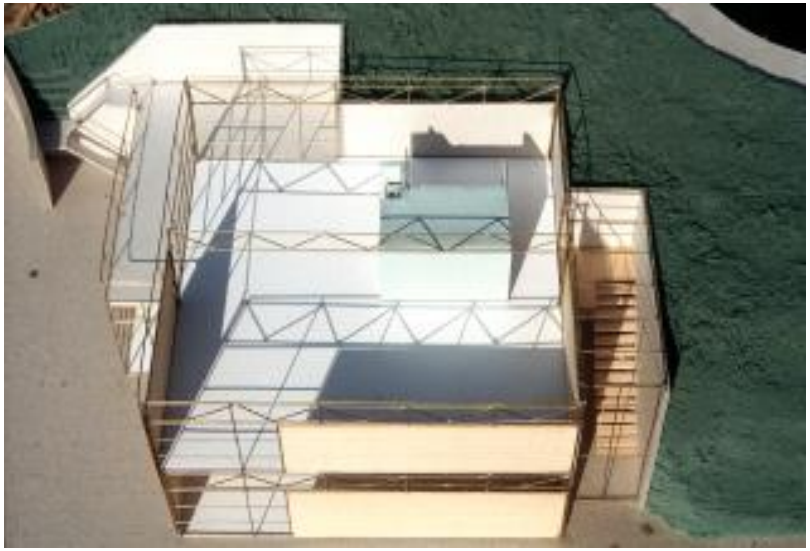
Renaturierung Emscher , Grüne Hauptstadt 2017, Klimainitiative Essen … (Stadt Essen)

Potentiale für Essen

Aber: So Reicht Das Nicht!

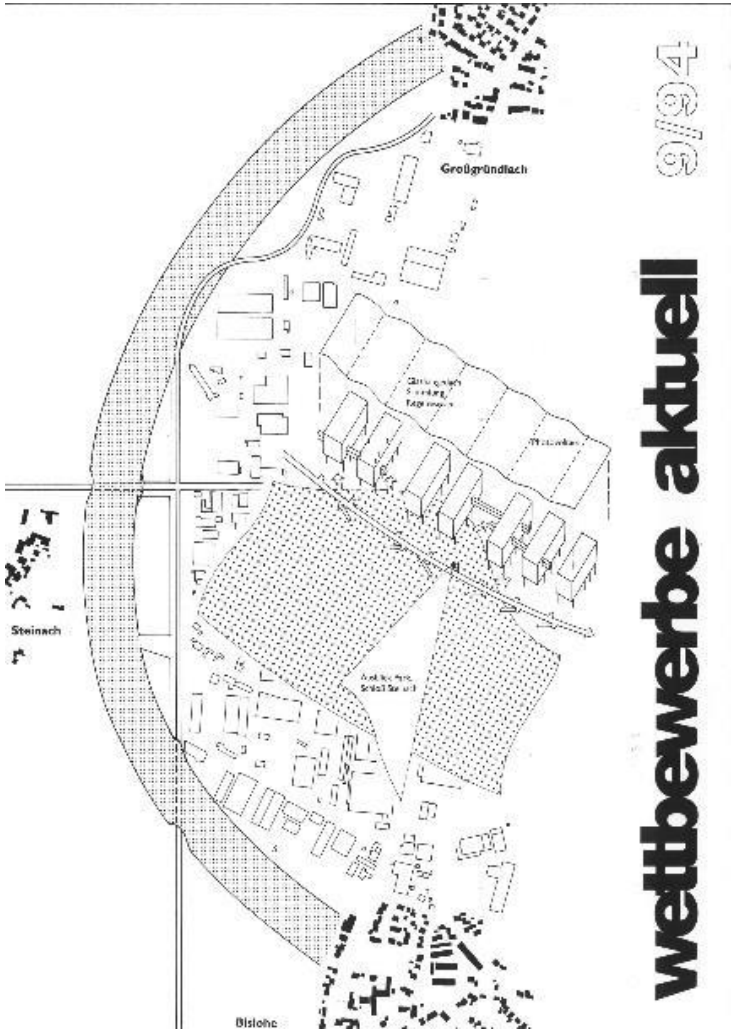


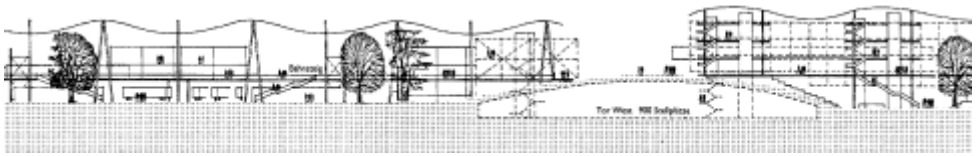




Potentiale für Essen

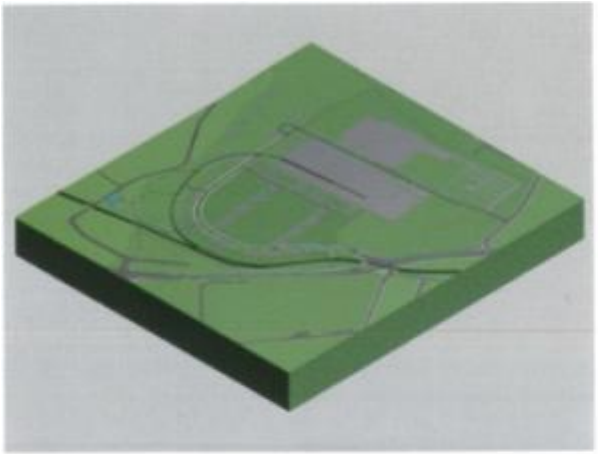
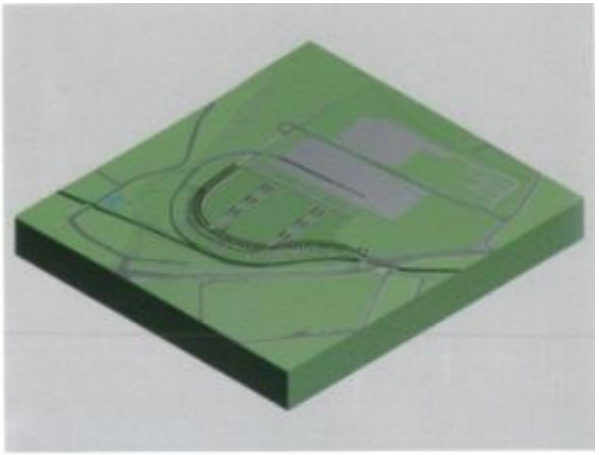
Wohnen und Landschaft: Haus und Studio R , BEM, nachträgliche Potentialanalyse (RMA)

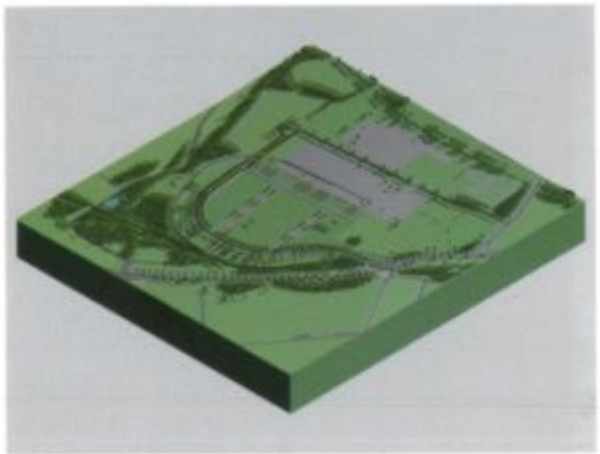
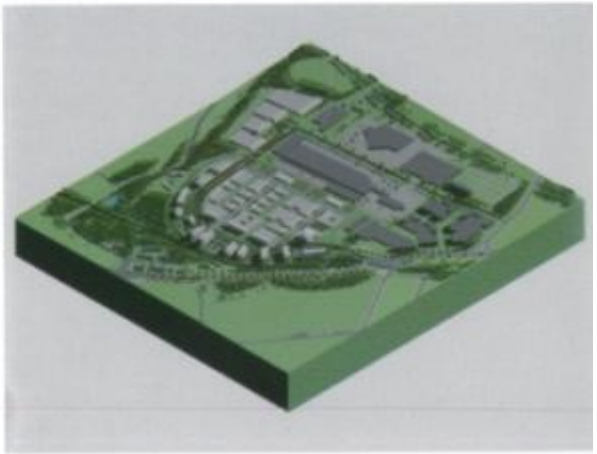




Potentiale für Essen

WBW 200 ha Technologiepark Nürnberg Erlangen Fürth (RMA)

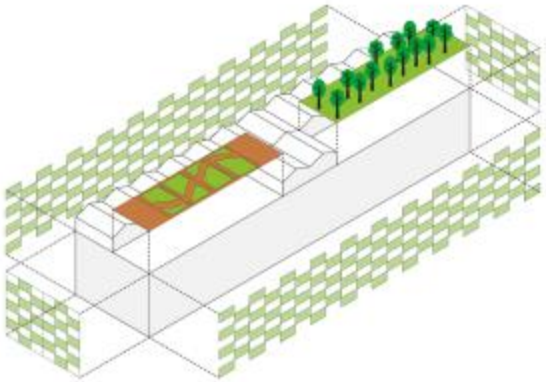

Potentiale für Essen

Konversion 40 ha Krupp Schwermaschinenbau, M1 Gewerbepark, Grün im Essener Norden (RMA)

Potentiale für Essen

M1, Ökologischer Gewerbebau, Solare Logistik: Pharmaka, Backmanufaktur Peter(RMA)

CO2 Bilanz



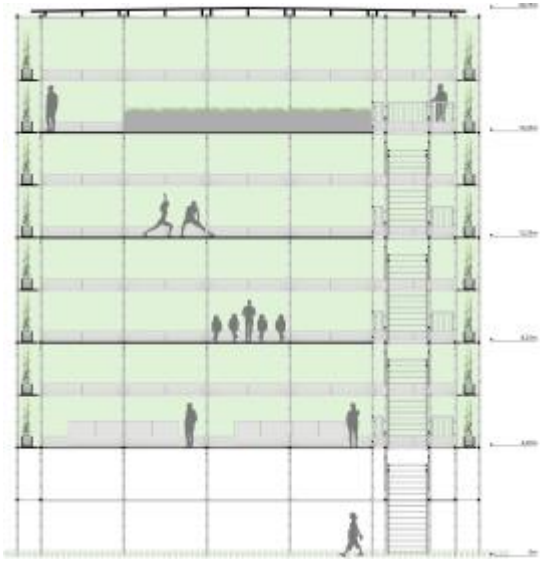
Grünfläche 4590m² (Fassade 3000m², Dachfläche 1590m²)	≈ 2754 kg CO_2
Sauerstoff freisetzung	≈ 1836 kg O_2
CO2-Emissionen in kg (für durchschnittliche Pendlerstrecke (9,6 km))	
Auto (mit Verbrennungsmotor (Benzin/Diesel))	≈ 379 kg CO_2
E-Bike (Ökostrom)	≈ 16 kg CO_2
Elektro-Auto (Ökostrom)	≈ 1 kg CO_2
Fahrrad	≈ 0 kg CO_2

Quellen:
https://www.co2-acker.de/
https://www.co2online.de/klima-schutz/mobilitaet/auto-co2-ausstoss/

*Angaben pro Jahr

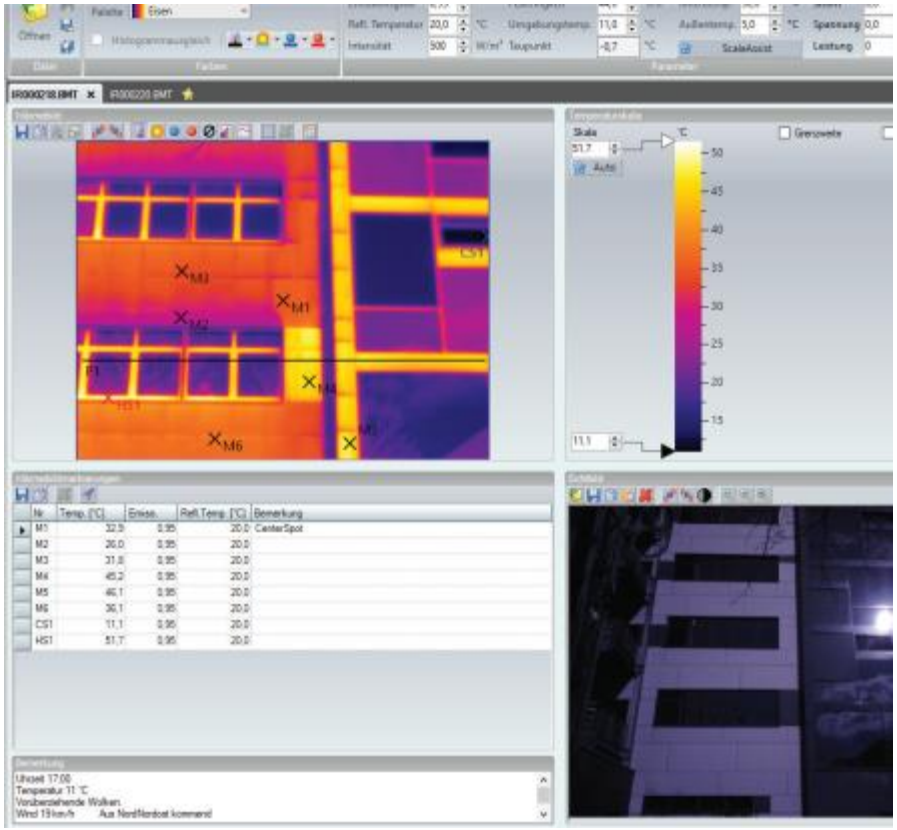
Potentiale für Essen

Urban Farming: Arbeitsagentur Oberhausen (Polisaward); Parkhaus, Büro Münster (MSA); M1, van Eupen (RMA)



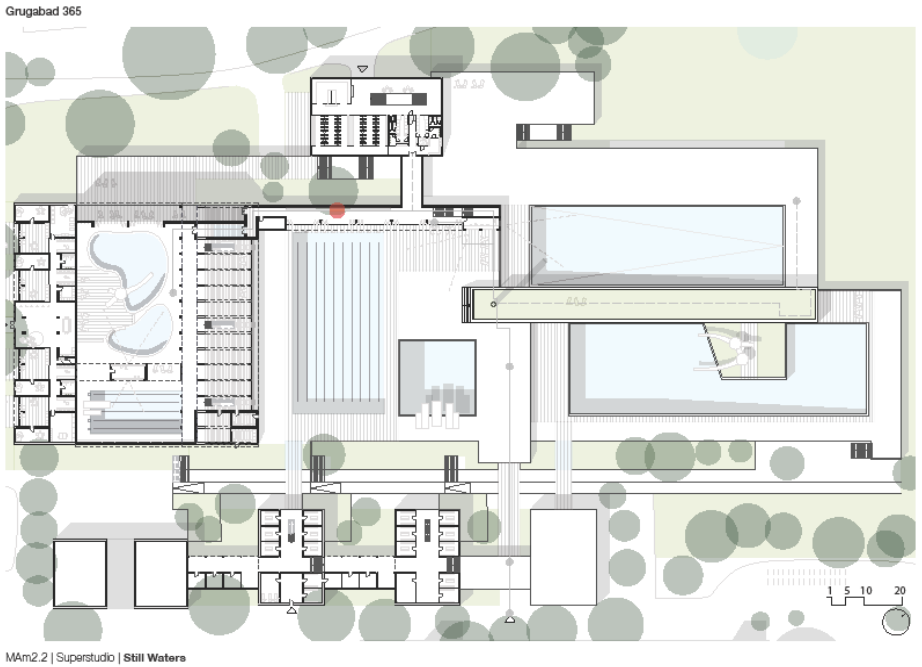
Potentiale für Essen

Grünfilter: Multifuntionaler Ausstellungsturm, Münster (MSA)



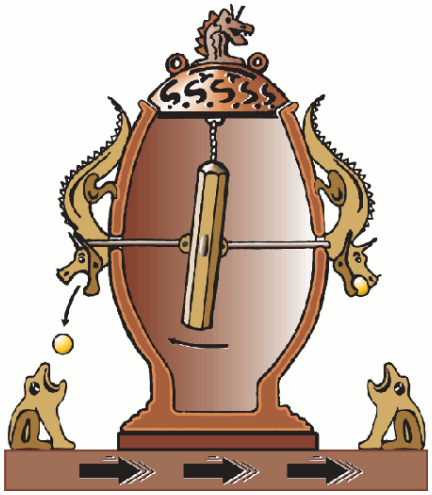
Potentiale für Essen

2nd Life Grugabad: Anlass, Seminar, Projektideen Masterstudio MSA Münster (MSA)

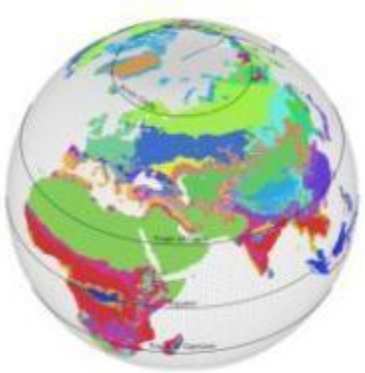


Potentiale für Essen

2nd Life Grugabad: Seminar, Projektideen Masterstudio MSA Münster (MSA)



rethink → reduce



recycle ← reuse

Potentiale für Essen: Lokale Netzwerke

Seismograph (Detektion Erdbeben China 200 n. Chr.) , Austausch, Moderation, Verantwortung

See mit dem längsten Namen, Guiness Buch der Rekorde :

„Manchaugaochangaugagogchaugoagungamaug“

Und zum Schluss:

See mit dem längsten Namen, Guiness Buch der Rekorde :

Manchaugaochangaugagogchaugoagungamaug

Von Indianer Nordamerikas praktizierte Ressourcenschonung:

„Wir fischen auf unserer Seite,
ihr fischt auf Eurer Seite,
und niemand fischt in der Mitte“

Und zum Schluss:

aus: von Weizsäcker, H. U., u.a.: Faktor Vier, S. 240, München 1995

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Einige weiterführende Quellen zum Thema