TOWARDS ECOCITIES

> Modules for Urban Ecology

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MAIN FEATURES OF AN ECOCITY

City of accessibility for everyone
City with public space for everyday life
City in balance with nature
City with integrated green areas
City of bioclimatic comfort
City of minimised land consumption
City for pedestrians, cyclists, and public transport
City of reduction, re-use, and recycling of waste
City contributing to closed water cycle
City of short distances
City of balanced mixed use
City with new balance of concentration and decentralisation
City as network of urban quarters
City as power station of renewable energies
City of health, safety, and well-being
City of sustainable lifestyle
City of qualified density
City of human scale and urbanity
City for strong local economy
City built and managed with the inhabitants
City of concentrating development at suitable sites
City integrated into the surrounding region
City of minimised energy consumption
City integrated in global communication networks
City of a cultural identity and social diversity

ECOCITY

OBJECTIVES

> ECOCITY - Urban Development towards appropriate structures for Sustainable Transport

> EU research project, Fifth Framework Programme Key Action 4: "City of Tomorrow and Cultural Heritage"

> The overall goal of the project is to develop settlement patterns for sustainable cities (ECOCITIES) as an alternative to urban sprawl.
ECOCITY

I. City of short distances
   > Project Südstadt, Tübingen, Germany

II. City of sustainable transport
   > Project Ecocity, Tübingen, Germany

II. City of bioclimatic comfort
   > Project Landsberger Allee, Berlin, Germany

IV. City as a solar powerstation
   > Project Solarcity Amorbach, Neckarsulm, Germany

V. City as a water-scape
   > Project Eva Lanxmeer, Culemborg, Netherlands

VI. City of agricultural integration
   > Project Saline Ostia Antica, Rome, Italy

VII. City of healthy building
    > Project Schafbrühl, Tübingen, Germany
I. CITY OF SHORT DISTANCES

> Project Südstadt, Tübingen, Germany
CITY OF SHORT DISTANCES

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City with public space for everyday life
City in balance with nature
City with integrated green areas
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ECOCITY

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City for pedestrians, cyclists and public transport
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JOACHIM EBLE ARCHITEKTUR

SHORT DISTANCE

> network of urban quarters
> strong local economy
> balanced mixed use
> qualified density
> minimised land use

URBAN ECOLOGY  2004
mixed use development

Tübingen, since 1993

Project by Lehen 3, Andreas Feldtkeller, et. al.
Objectives:
> to create an urban skeleton for the Südstadt, which so far has been dominated by barriers and inaccessible terrains
> to foster inside-out development, instead of green field planning
> the effort to create an urban, small-parcelled and mixed-used structure as opposed to a housing development
> Special development procedure „Städtebauliche Entwicklungsmaßnahme“
Building density is exceptionally high. High-density building is much more affordable. Nearly all of the older military buildings are given to other uses (attractive offer particularly to small industrial workshops). Large variety of public social and cultural facilities.
The majority of the Südstadt home-owners are private builders who have joined together in so-called “private building co-operatives” consistently selling the parcels to private bidders, by determining size and shape of each parcel in accordance with the buyer’s needs and by a supportive city administration.
A multitude of very different, highly individual projects have been created, most of them with costs ranging much lower than those generated by conventional builders.
> desegregation of living and working renders the organisation of daily life easier, facilitates contacts and minimizes distances.

> Mixed quarters are highly attractive and lively, compared to segregated, single use residential and industrial quarters.

> Objective is to create a small-parcelled, vertical mixture.

> So far around 120 “businesses” with about 750 employees have decided to settle here, particularly on ground level and in older buildings.
Cars are not prohibited in these quarters, but the vehicles of employees, inhabitants and visitors are parked in public neighborhood-garages.
The Südstadt’s public spaces, roads and plazas mainly serve as communicative spaces for the inhabitants and those who work here. Their function as traffic network is secondary. The use of the multitude of spaces generated by this policy is determined and facilitated in a co-operative process.
MIXED USE DEVELOPMENT KÜHL KG
FRANKFURT / GERMANY
ENERGY CONCEPT WITH GLASHOUSE AND RE-USE OF PRODUCED ENERGY
II. CITY OF SUSTAINABLE TRANSPORT

> Project Ecocity, Tübingen, Germany
CITY OF SUSTAINABLE TRANSPORT

City of accessibility for everyone
City with public space for everyday life
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ECOCITY

CITY OF SUSTAINABLE TRANSPORT
TARGETS FOR TÜBINGEN:

> to prevent urban sprawl by concentrating settlement areas around public transport stops
> to suggest a land use management on the city level in accordance to municipal and regional public transport
> to develop a strategy for resolving the conflict between minimisation of land consumption and the protection of surrounding environments versus the need for new settlement areas
SAIBEN
Last housing area that can be developed within the City Limits

DIFFICULT ACCESS
Probably only a difficult and expensive access to the Saiben Area
**PLANS FOR NEW REGIONAL TRAM-TRAIN**

- Proposed extension as tram to city centre
- Tübingen main station
- Type of railway crossing?
- Planned new stops
- Existing regional train stop (to be relocated)
- Existing regional rail line – second track proposed
CLASSIFICATION

TRAFFIC CALMED
- STANDARD PARKING
- TRAFFIC CALMED ROADS WITH THROUGH ROUTES
- NO NEIGHBOURHOOD SERVICE CONCEPT

CAR-REDUCED
- REDUCED PARKING
- LIMITED ACCESS FOR PRIVATE CARS, NO THROUGH ROADS
- BASIC NEIGHBOURHOOD SERVICE CONCEPT

CAR-FREE
- GREATLY REDUCED PARKING
- NO ACCESS FOR PRIVATE CARS; PRIORITY FOR PEDESTRIANS AND CYCLISTS
- COMPREHENSIVE NEIGHBOURHOOD SERVICE CONCEPT
CAR-FREE QUARTER SAIBEN

> SAIBEN CENTRAL WITH OPEN BLOCKS FLOOR AREA RATIO 1.15
> SAIBEN VILLAGE 1 FLOOR AREA RATIO 0.7
> SAIBEN EDGE WITH SOLAR HOUSING FLOOR AREA RATIO 0.9
> NEW LIGHT RAIL STOP AND MOBILITY CENTRE WITH SOLAR ROOF
> INTERNATIONAL SCHOOL, MULTI-PURPOSE HALL
> UNDERPASS WITH WATER CASCADES
> USING WATER TO ENHANCE THE QUALITY OF PUBLIC SPACES
> PARK FOR LEISURE ACTIVITIES AND WATER PURIFICATION AND INFILTRATION FACILITIES
> GREEN URBAN EDGE CONTAINING ECOLOGICAL INFRASTRUCTURE AND PREVENTING FURTHER EXTENSIONS
> WELL CONNECTED THROUGH LIGHT RAIL AND BUS SERVICE
> INTERNAL ROUTES RESERVED FOR PEDESTRIANS AND CYCLISTS, DIRECT CYCLE ROUTE INTO SÜDSTADT AND CITY CENTRE
> GREATLY REDUCED PARKING PROVISION IN GARAGE EAST OF RAILWAY LINE
> SERVICE / EMERGENCY ACCESS VIA INNER SERVICE RING
> COMPREHENSIVE MOBILITY CONCEPT: PICK-UP BOXES & LOCAL DELIVERY SERVICE, MOBILITY CENTRE, BIKE REPAIR & SHOP, CAR CLUB, PT INFORMATION ...
MOBILITY

ELECTROBUGGY FOR LOCAL DELIVERIES

LIGHT RAIL SERVICE

CROSSING THE RAILWAY

BIKE - STORAGE

PICK-UP BOXES

ELECTRIC CAR-CLUB FLEET

URBAN ECOLOGY 2004
VAUBAN PROJECT IN FREIBURG / GERMANY

Transport and mobility concept:
> Reduced number of private cars to be parked in the periphery (about 40% of the households agreed to live without an own car)
> Good public transport with a tramline to the city that will be built until 2006
> Convenient car sharing system
> streets and other public spaces are/will be playground for kids and places for social interaction
STREETS AND PUBLIC SPACE AS PLAYGROUNDS

Freiburg Vauban, since 1995
> streets and other public spaces are/will be playground for kids and places for social interaction
SLOW TRAFFIC IN HOUSING AREAS

TRANSIT ORIENTED
III. CITY OF BIOCLIMATIC COMFORT

> Project Landsberger Allee, Berlin, Germany
CITY OF BIOCLIMATIC COMFORT

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BIOCLIMATE

- Integration in the surrounding region
- Healthy, safety, well-being
- Protection from the elements
- Improvement of the outdoor comfort

ECOCITY

- City of human scale and urbanity
- City of qualified density
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URBAN ECOLOGY 2004
Task: Urban-Ecological Accompanied Planning for an Industry and Residential Housing Project of Daniel Libeskind

Consultation: 1995

Client: Senate of the Land Berlin

Bioclimate
URBAN CLIMATE

BIOCLIMATE

> Natural climate concepts for urban structure
Water concepts for rainwater retention, bioclimatic improvements and attractive open spaces
DETAILS OF THE ENERGY CONCEPT

BIOCLIMATE

> Natural ventilation concepts for and commercial estates

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INDUSTRIAL STRIP

Synergy of energy, urban climate and water concepts

BIOCLIMATE

> Synergy of energy, urban climate and water concepts
DETAILS OF THE WATER CONCEPT

Rainwater is used to support the ventilation concepts of buildings.
CAR DESIGN CENTER IN LONDON
FOSTER AND PARTNER / ATELIER DREISEITL

BIOCLIMATE

- cooling strategy
- cleansing biotope
COOLING STRATEGY WITH CLEANSING BIOTOPE

BIOCLIMATE

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URBAN ECOLOGY 2004
Task:
61 apartments, 32 offices, 9 shops, 1 kindergarten, 1 cafe

Floor Area: 16,500 m²

Completion: 1998

Client:
Karlsruher Lebensversicherungs AG, Karlsruhe
CITY QUARTER WITH QUALIFIED DENSITY

> Part of the urban renewal project Gostenhof-Ost, situated in the inner city of Nuremberg

BIOCLIMATE
MIXED CITY BLOCK AS A CITY OASIS

> Block development as mixed used complex: 61 flats, 32 office units, 9 shops, 1 kindergarten, 1 cafe, greenhouse lobby

BIOCLIMATE
NATURAL CLIMATE CONCEPT

Solar Energy Concept:
> Big greenhouses on the south side to the courtyard as a sheltered inner realm
> Natural ventilation: cooling of offices in the summertime, heating in winter (supported by plants and water)
Rainwater Management Concept:
Runoff reduction, collection and conveyance, rainwater use, water treatment as biofilters, retention with cisterns, infiltration
ART AND ECOLOGY

> Combination of an art, solar energy concept and a rainwater management system

BIOCLIMATE
WATERWALLS AS „COOLAIR-SHROWER“

> Combination of art, solar energy concept and a rainwater management system

BIOCLIMATE
IV. CITY AS A SOLAR POWERSTATION

> Project Solarcity Amorbach, Neckarsulm, Germany
SOLARCITY AMORBACH IN NECKARSULM / GERMANY
MASTERPLAN

> Amorbach

> Neckarsulm, since 1992

> Location north of Stuttgart

> Furthest-reaching urban planning project for seasonal storage of solar energy

> Large collector panels and seasonal underground duct storage facility

> German Solar Prize 1998

> Research project of the EU, the Federal Ministry for Science, Research and Technology and the German Foundation Bundesstiftung Umwelt

> Development of Energy Concept by Steinbeis-Transferzentrum EGS, Stuttgart and Institute for Thermodynamic of the University of Stuttgart

neckarsulm - amorbach
CENTRAL AREA

SOLAR CITY

> Amorbach
> Neckarsulm, since 1992

Aerial View on Central Area

> Installation of collector panels on the roof of multi-family buildings, a school with sports hall, a shopping centre, a residence for elderly people and on top of a parking lot.
DEVELOPMENT

SOLAR CITY

> Amorbach

> Neckarsulm, since 1992

Development:

> Area with about 1,300 dwellings and 51 ha will be connected to the district heating net

> 6,340 m² of collector area in the first and second phase, in the end a total size of 12,000 m² is anticipated

> A high solar fraction of more than 50% is anticipated by combining reduced energy demand of the houses (25% better insulation standard as the building code requires) with solar heat and seasonal storage
SEASONAL STORAGE

Seasonal Storage

- Storage of surplus solar heat in summertime in a seasonal duct storage is possible with a long-term storage volume of now 55,000 m³ (can be extended up to 140,000 m³).
- Vertical boreholes (30m in depth) are used to heat up the ground.
- In winter time the heat is drawn off and supplied to the buildings.

SOLAR CITY

- Amorbach
- Neckarsulm, since 1992
LIFE CYCLE ASSESSMENT PROJECT IN BERLIN

> Heinrich-Böll Settlement
> Ecological City Quaters
> Berlin-Pankow, 1999
SOLAR SETTLEMENT SCHLIERBERG
IN FREIBURG / GERMANY

> Freiburg Vauban, since 1995

SOLAR CITY

150 so-called plus energy houses, which generate more energy than they consume in the course of a year.

All houses are facing to the south and have solar roofs with photovoltaic modules for the generation of electricity.
PASSIVE HOUSING PROJECT IN ULM / GERMANY

SOLAR CITY
PASSIVE HOUSE TECHNOLOGY

Holzpellets
40 m³ Jahresvorrat
Holz-Pellet-Kessel 100 kW
Pufferspeicher 4 m³
Nahwärmenetz

Warmwasser
Pufferspeicher 190 l

Wärmeversorgung
Heizung/Lüftung/Sanitär

Sonnenkollektoren 70 m²

Energiezentrale

17 Häuser am Nahwärmenetz

Passivhäuser Ulm Selberstraße

Zuluft EG 60 m³/h
Zuluft OG 60 m³/h

Frischluft-Ansaugung

Fortluft

SOLAR CITY
V. CITY AS A WATER-SCAPE

> Project Eva Lanxmeer, Culemborg, Netherlands
CITY AS A WATER-SCAPE

- City of accessibility for everyone
- City with public space for everyday life
- City in balance with nature
- City with integrated green areas
- City of bioclimatic comfort

- City for pedestrians, cyclists, and public transport
- City of reduction, re-use, and recycling of waste
- City contributing to closed water cycle

ECOCITY

- City of minimised land consumption
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- City integrated in global communication networks
- City of health, safety and well-being

WATER-SCAPE

- > balanced with nature
- > integrated green areas
- > contribution to closed water cycles
Development by the Gemeente Culemborg and the private foundation E.V.A.

Planning: Since 1998

Model project for sustainable urban development of the Dutch ministry VROM (Ministry for Housing, Spatial Planning and Environmental Protection)
镇扩展，位于荷兰的乌得勒支南部，靠近城市中心车站，原为一个水采区。
> Permaculture installations with differently designed zones: private gardens, private courtyards, intensively used green of open spaces, extensively used green spaces and a natural zone

> Agri-urban border concept with integration of ecological agriculture
MAINTENANCE

> Open space contains the ecological infrastructure

> A big part of the open spaces and landscape structures are collaboratively managed and cultivated by organizations of the residents

WATER-SCAPE
SOLAR COURTYARDS

WATER-SCAPE

> Residential Courtyards

> Character of a gardencity with building ensembles embedded in the green of gardens, rainwater treatment areas and parks
PARTICIPATION OF THE INHABITANTS

> Green courtyards designed, built and maintained by the residents

WATER-SCAPE
Water Cycles:

- situated in a water conservation district
- rainwater infiltration retention
- less polluted wastewater is conducted to wastewater treatment wetland facilities
- wastewater is treated and used for the generation of biogas
WATER AND ENERGY CONCEPT

- Optimized urban structure: buildings facing to the south and optimized distances to avoid shading
- High energy standard
- District heating: energy is gained of the rinsing water
- Support by solar energies: photovoltaic panels, collectors panels, greenhouses and use of wind energy, further heat pumps, area with a co-generation plant that is operated with biogas (generated from wastewater)
> rainwater retention
> wastewater treatment wetland facilities
WATER-SCAPE

Client:
Strenger Bauen und Wohnen GmbH, Ludwigsburg

Task:
84 units as detached single family houses, terraced houses and appartment

Floor Area: 5,700 m²


Completion: 2002
LANDSCAPE INTEGRATION

> Ecological City Quarters
> Arkadien Asperg
> Asperg, 2002
WATER PLAYGROUNDS / ATELIER DREISEITL

> Ecological City Quarters
> Arkadien Asperg
> Asperg, 2002
WATER PLAYGROUNDS / ATELIER DREISEITL

WATER-SCAPE
WATER AS DESIGN-ELEMENT IN THE CITY
ATELIER DREISEITL

> playground for all generations!

WATER-SCAPE

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URBAN ECOLOGY  2004
WATER AS DESIGN-ELEMENT IN THE CITY
ATELIER DREISEITL

> symbiosis of all senses in a water-design for a small city center
VI. CITY OF AGRICULTURAL INTEGRATION

> Project Saline Ostia Antica, Rome, Italy
CITY OF AGRICULTURAL INTEGRATION

City of accessibility for everyone
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City of permaculture development

ECOCITY

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PERMACULTURE

> development of permaculture in private and public green
> agricultural border concept around the city
> agriculture to provide energy and pure water

CITY OF AGRICULTURAL INTEGRATION

City of human scale and urbanity
City with agricultural border concept
City for strong local economy
City built and managed with the inhabitants
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PERMACULTURE

Client: City of Rome

Task: agri-urban development

Project-Studie: 1996

PROJECTAREA SALINE OSTIA ANTICA
NEARBY ROME / ITALY
Considered the dimension and the complexity of the requalification of the Saline - Ostia Area area, the project is structured on more different renewable energies and is articulated in three successive development scenarios: "Conventional" Scenario 1, "Sustainable" Scenario 2, "Solar vision" Scenario 3.

Comparison of primary energy consumption according to the three scenarios.

energy cycle

production

induced

operating

bio-mass
in Central
Heating Station

bio-oil +
bio-gas
in urban
cogeneration
plant

“grey”
energy

selection of low
energetic
consumption
materials

demolition

minimization of
not renewable
sources

renewable and
regenerable
sources use

solar hydrogen
into gas net

planta

installation

emission
control

plant type

urban texture
characteristics

appropriate use
check

energetic
control

comfort level
optimization

low energetic
consumption
components and
technique

assembly

assembly

treatment

“grey”
energy

selection of low
energetic
consumption
materials

recycling

waste in final destination

urban texture
characteristics

appropriate use
check

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energy cycle
CO₂ NEUTRAL ENERGY CONCEPT

PERMACULTURE

<table>
<thead>
<tr>
<th>RENEWABLE ENERGY SUPPLY</th>
<th>ELECTRICITY (mWh/y)</th>
<th>THERMAL ENERGY (mWh/y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>biogas</td>
<td>384</td>
<td>430</td>
</tr>
<tr>
<td>bio oil</td>
<td>456</td>
<td>660</td>
</tr>
<tr>
<td>wood</td>
<td></td>
<td>1,620</td>
</tr>
<tr>
<td>(energy forest/canal)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>solar thermal collector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>field with heat storage</td>
<td>1,125</td>
<td>2500 m²</td>
</tr>
<tr>
<td>Solar thermal collector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>field with heat storage</td>
<td>1,350</td>
<td>(3,000 m²)</td>
</tr>
<tr>
<td>total</td>
<td>640</td>
<td>3,195</td>
</tr>
</tbody>
</table>

- manure from horses (biogas)
- plantation energy forest (60 ha.)
- energy field (120 ha.)
- biomass canal plantation
- decentral/solar systems
- cogeneration heat power plant
- heating network
- heat storage
ENERGY AND WATER CONCEPT DISTRICT A

PERMACULTURE
SOLAR VILLAGE DISTRICT C

PERMACULTURE

new building typology
„solar-village“

district C
size of storage:
3,000 m²
4,500 m²
use surface for collectors:
4,000 m²
petrified net of solar surface:
4,500 m²

solar-active zone
PV and warm water roof collectors
green areas recreation, landscape & water filtration
local rain-water retention for filtration in the place
heating network with heat storage

solar-passive zone
glass-houses, arcades & lobbies
trees of energy forest wind smaller from high

permaculture sun garden

aquaponics

combination of hedge, canal and path
energy-forest

hollow for fogging and evaporation

school as solar wall

window, wall
**WATER CYCLE**

<table>
<thead>
<tr>
<th>Water need</th>
<th>Consumptions</th>
<th>Target</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>urban need</td>
<td>112 l/day/inhab.</td>
<td>50 l/day/inhab</td>
<td>reduction of drinking water costs, household + rain water recycling</td>
</tr>
<tr>
<td>agricultural need</td>
<td>1500 cm³/ha/year</td>
<td>961 cm³/ha/year</td>
<td>increase of soil retention water capacity; Tevere river water purification for irrigation</td>
</tr>
</tbody>
</table>

**Water System: urban and agricultural interaction**

- Urban area: sewage control cycle, agricultural area: sewage reclamation cycle
- Agricultural water control, pumping station
- Irrigation water control, pumping station
- Bio-sewage plant
- Storage and purification lagoon
- Cutting off sewage plant

**Permaculture**

- Water cycle
- Clear water
- Grey water
- Black water
- Waste in final destination
- Urban level: Tibet river water recovery for irrigation system
- Household: rain water use via ground water well
- Mixing in tank with layer water
- Maintenance in lots
- Water collection
- Permeable paving
- Street water, soil removing
- Overflow in Tibet river through cooperation energy
- Gravitational circulation
- Channel section design
- Infiltration in Tibet river through cooperation energy
RESOURCE MANAGEMENT: SOIL AND WATER

utilization of water from river, purification in upstream sewage plants

bio-sewage plant
soil body retention system

urban area as rainfall retention system, plots as water storage system, green roofs
cutting off sewage plant

estimated water that might be pumped into agricultural area:
1st year: 400,000 m³ (5 m³/sec.)
2nd year: 200,000 m³ (1 m³/sec.)
3rd year: 50,000 m³ (5 m³/sec.)

urban water cycle
agricultural water-system
soil body as retention system "sponge"
lagoons for storage and purification of water
pumping station (solar pump)
main - sewage plant
biological sewage plant (2 ha.) with reed beds and ponds
BORDERCONCEPT SOLAR-VILLAGE

PERMACULTURE
**WASTE CYCLE**

![Waste Cycle Diagram](image)

**PERMACULTURE**

The bio-waste processing plant, for the waste of 50,000 people, has to be seen in connection with the urban project which is a part of the "Bio-Agriculture Sustainable Project". For the energy concept sustainability only the amount of bio-waste of the inhabitants of Salina is considered.

**Annual Urban Solid Waste Production (kg/inhab)**

<table>
<thead>
<tr>
<th>Inhabitants</th>
<th>minimum waste 18%</th>
<th>bio waste 41%</th>
<th>inert 9%</th>
<th>plastic material 6%</th>
<th>cellulosic material 23%</th>
<th>Total (kg) 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>for 1</td>
<td>43.74</td>
<td>99.63</td>
<td>23.18</td>
<td>14.38</td>
<td>55.89</td>
<td>243</td>
</tr>
<tr>
<td>for 4,000</td>
<td>174.960</td>
<td>398.520</td>
<td>87.480</td>
<td>58.320</td>
<td>233.560</td>
<td>972.000</td>
</tr>
<tr>
<td>for 7,800</td>
<td>341.172</td>
<td>777.184</td>
<td>170.580</td>
<td>113.724</td>
<td>435.942</td>
<td>1,895.400</td>
</tr>
<tr>
<td>for 8,500</td>
<td>372.446</td>
<td>848.350</td>
<td>186.223</td>
<td>134.149</td>
<td>475.303</td>
<td>2,069.145</td>
</tr>
<tr>
<td>for 12,800</td>
<td>559.872</td>
<td>1,375.264</td>
<td>279.936</td>
<td>186.624</td>
<td>715.391</td>
<td>3,110.400</td>
</tr>
<tr>
<td>for 58,000</td>
<td>2,536.920</td>
<td>5,778.540</td>
<td>1,268.460</td>
<td>845.640</td>
<td>3,241.620</td>
<td>14,094.000</td>
</tr>
</tbody>
</table>

The bio-waste processing plant, for the waste of 50,000 people, has to be seen in connection with the urban project which is a part of the "Bio-Agriculture Sustainable Project". For the energy concept sustainability only the amount of bio-waste of the inhabitants of Salina is considered.

**Green Compost from Manure as Compost Station**

**Solar Energy**

**Compost**

**Anaerobic Fermentation**

**Fields**

**Plants**

**Food**

**Bio-waste**

**Compost Station**

**Biogas Production**

**Waste in Final Destination**

**Putrescible**

**Re-Letting in of Not Treated Products**

**Glass**

**Paper Plastic Wood Metal**

**Treatment Process with Different Technologies for the Waste Biologies**

** bio-gas production**

**Biomass Production**

**Green Waste Collection**

**Differentiate Collection**

**Waste in Final Destination**

**Re-Letting in of Productive Cycles**

**From Production Activities**

**Products of Recycle**

**Products of Recycle**

**Waste in Final Destination**
CYCLE OF SUBSTANCES
WASTE RECYCLING

- Dung, biowaste, fertilizer
- Agricultural plant
- Food
- Grey water, rain
- Reed bed
- Compost, bioreaktor, biowaste
- Black waste water, using existing pipes
- Forest of biomass
- Purification in reed plants
- Energy

PERMACULTURE

URBAN ECOLOGY 2004
BIO-AGRICULTURAL MANAGEMENT
HUMUS

Intensive cultivations
50 ha horticulture
250 ha open field

Rotation system in open field
2 years

Extensive cultivations
Crop rotation system
6/7 years

New Bio-Agriculture management results

INPUT

OUTPUT

| Irrigation water |
| Renewable energy for irrigation system |
| Bio seeds |
| Work |

| Compost |
| Manure |
| Eco-compatible fertilizer |

Biomass for energy production
= MWh/y 3.420
(sunflowers, willows, straw)

Food production
Cereals = ton/y 3.000
(timber, milk, vegetables, fruits, seeds)
BIO-AGRICULTURAL PROJECT
HERMANNSDORFER LANDWERKSTÄTTEN
IN GLOND NEARBY MUNICH / GERMANY

Client: Schweisfurtstiftung karl-Ludwig Schweisfurt

Task: ecological model-farm workshops 
brewery, bakery, butchery 
restaurant and shop

Floor Area: 3,300m²


Completion: 1994
ECOLOGICAL MODEL-FARM, SHOP AND RESTAURANT

PERMACULTURE

ECOLOGICAL MODEL-FARM, SHOP AND RESTAURANT

PERMACULTURE

JOACHIM EBLE ARCHITEKTUR

URBAN ECOLOGY 2004
BAKERY AND BUTCHERY

PERMACULTURE
VII. CITY OF HEALTHY BUILDING

> Project Schafbrühl, Tübingen, Germany
### CITY OF HEALTHY BUILDING

| City with accessibility for everyone | City with public space for everyday life | City in balance with nature | City with integrated green areas | City of bioclimatic comfort |
| City of minimised land consumption | City for pedestrians, cyclists and public transport | City of reduction, re-use and recycling of waste | City contributing to closed water cycle | City of healthy building |
| City of balanced mixed use | City of short distances | City of healthy building | City of permaculture development | |
JOACHIM EBLE ARCHITEKTUR

ECOLOGICAL SETTLEMENT SCHAFBRÜHL
IN TÜBINGEN / GERMANY

Client: Karlsruher Lebensversicherung AG, Karlsruhe
Task: 103 apartments
Floor Area: 8,500 m²
Costs: 8.2 Mio. €
Completion: 1986

> rainwater concept
> passive solar architecture
> biological materials
> regional shape

HEALTHY BUILDING

URBAN ECOLOGY 2004
BIOSOLAR SETTLEMENT ZUFFENHAUSEN
STUTTGART / GERMANY

JOACHIM EBLE ARCHITEKTUR

HEALTHY BUILDING

Client: Siedlungswerk Stuttgart
Task: 6 houses in 73 apartments
Floor Area: 5,800 m²
Costs: 8.3 Mio. €
Completion: 1991

URBAN ECOLOGY 2004
ECOLOGICAL CITY QUARTER IN ASPERG / GERMANY

Client: Strenger Bauen und Wohnen GmbH, Ludwigsburg

Task: 84 units as detached single family houses, terraced houses and apartments

Floor Area: 5.700 m²


Completion: 2002
VARIOUS HOUSING FORMS

HEALTHY BUILDING

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URBAN ECOLOGY  2004
MASSIVE WOOD TECHNOLOGIE SETTLEMENT
BORNSTEDTER FELD IN POTSDAM / GERMANY

Client: GSW - gesellschaft für Stadterneuerung berlin
Task: 37 terraced houses
Floor Area: 4,320 m²
Completion: 2001
KINDERGARTEN / DAYNURSERY IN STUTTGART-SILLENBUCH / GERMANY

> Stuttgart-Sillenbuch, 1998

Client:
City of Stuttgart, Hochbauamt

Task:
7 group rooms for 140 children, 1 multifunctional room for municipal social therapy

Floor Area: 1,100 m²
Costs: 2,36 Mio. €
INDUSTRIAL MASSIVE TIMBER SYSTEM
“BRETTSTAPELTECHNOLOGIE”

JOACHIM EBLE ARCHITEKTUR

HEALTHY BUILDING

URBAN ECOLOGY 2004
USE OF NATURAL MATERIALS...
...FOR A HEALTHY INDOOR CLIMATE
TOWARDS ECOCITIES

> Modules for Urban Ecology

Dipl.-Ing. Joachim Eble
Freier Architekt dwb BAU BDA