# The SUSTAINABLE City

*In-session workshop on mitigation SBSTA 26*
*Bonn, Germany*
*2007-05-11*

*Henrik Berg von Linde,*
*Senior Chief Architect of SWECO*





## A SWEDISH Partnership Initiative

REGERINGSKANSLIET

EXPORTRÅDET
SWEDISH TRADE COUNCIL

SWECO

*Structure of my speech:*

***The Purpose and the main Features of the Concept***

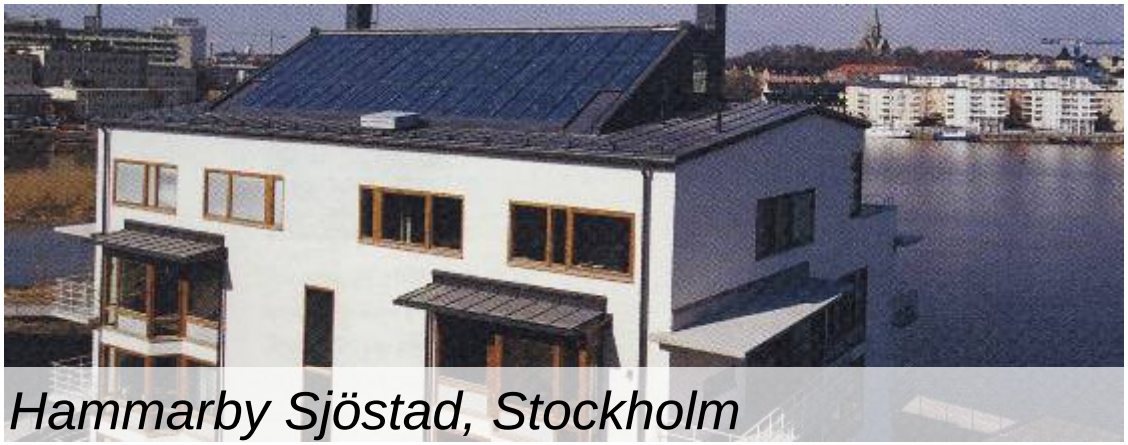
***”Ecological Planning” in practice***

***The Eco-cycle Model***

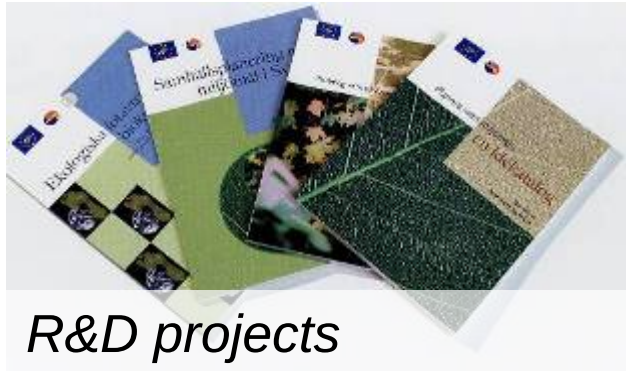
***Conclusions***

## *The purpose of the concept (1)*

*To gather, analyze, convey and apply the Swedish knowledge base and experiences from research, business sector and public sector within the environmental technology field in an urban and international context*



*Hammarby Sjöstad, Stockholm*



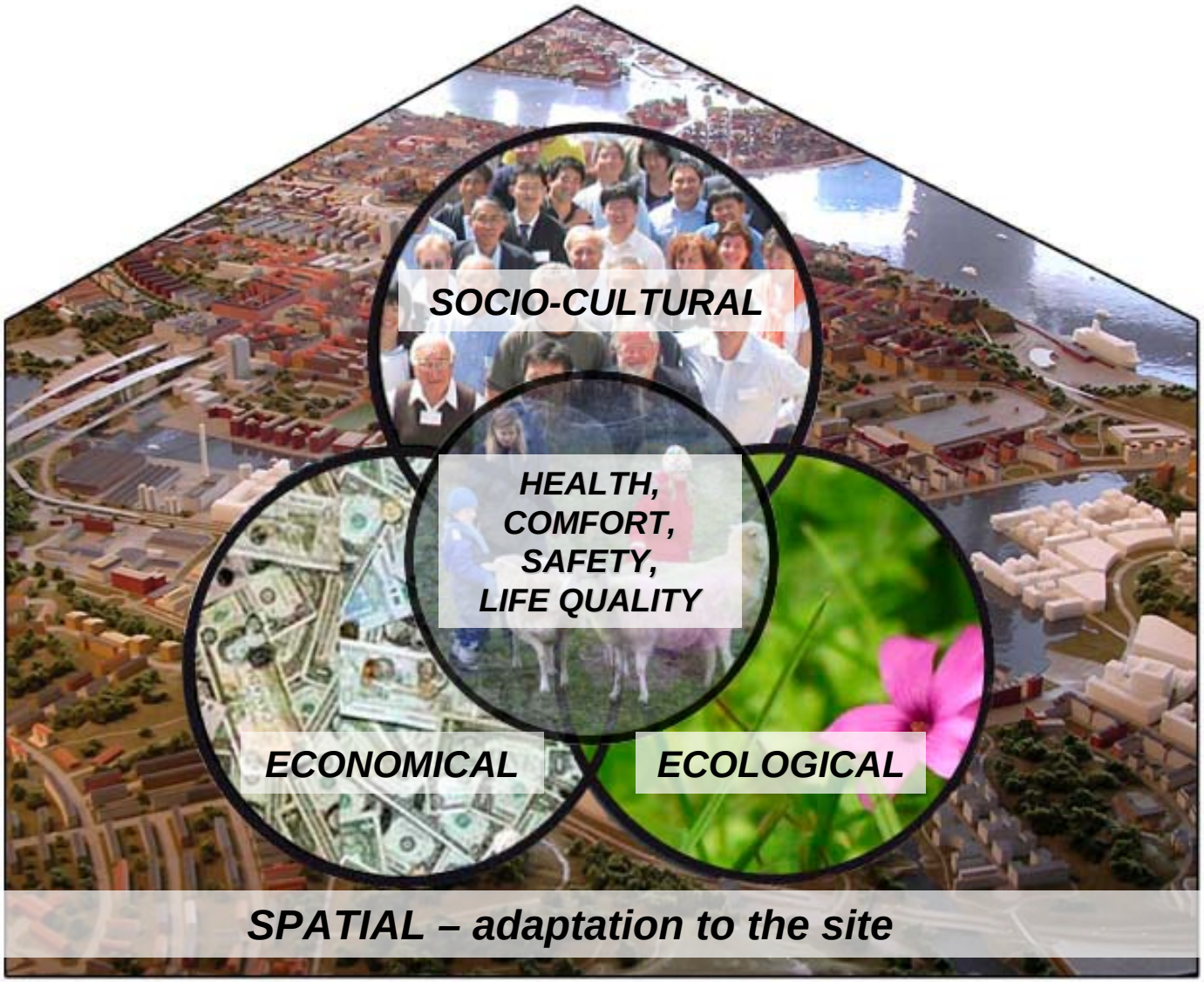
*R&D projects*

*Bo 01 Malmö*

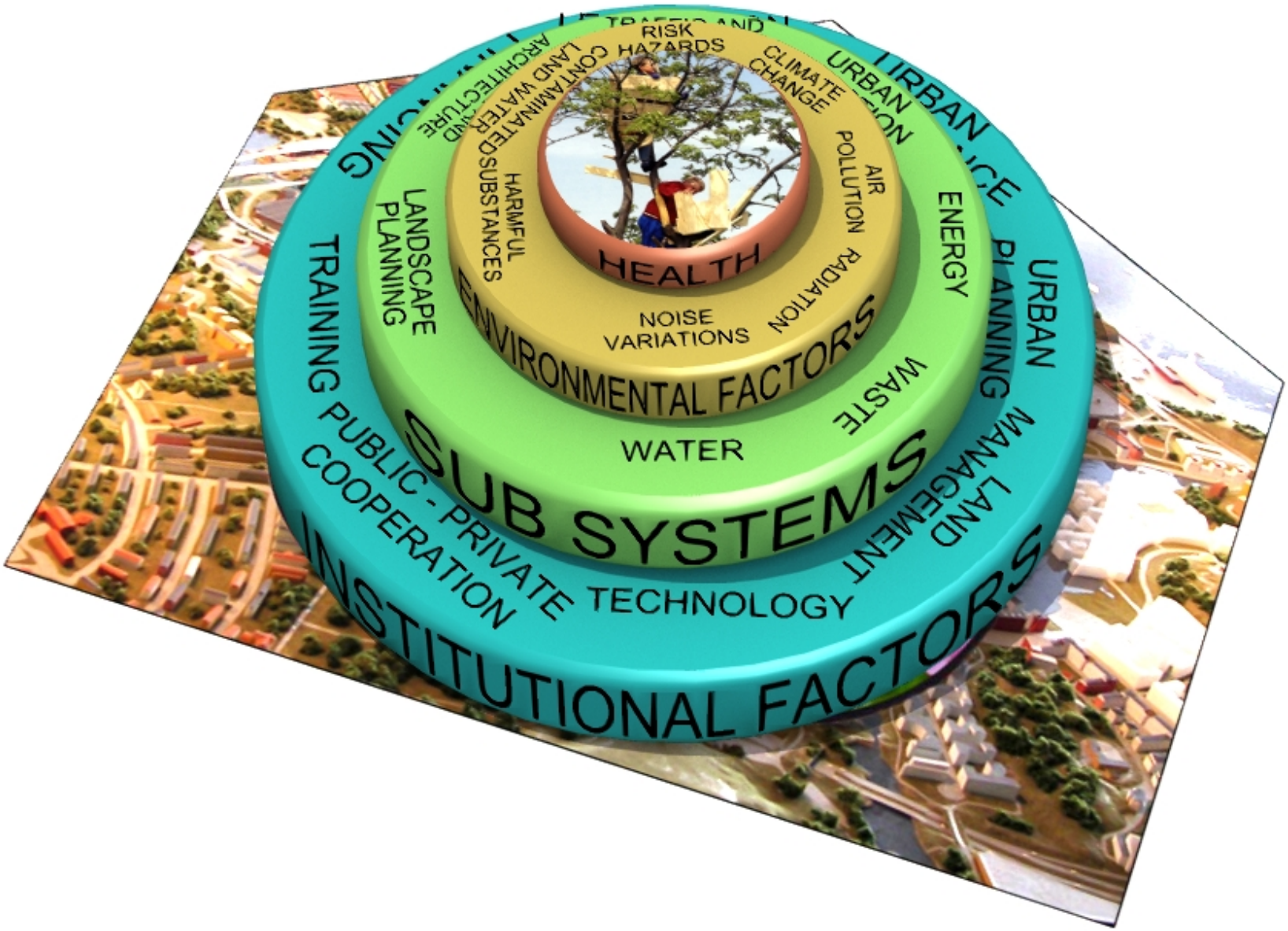
*Gårdsten, Gothenburg*

## *The purpose of the concept (2)*

*To develop a HOLISTIC CONCEPT for sustainable urban development*

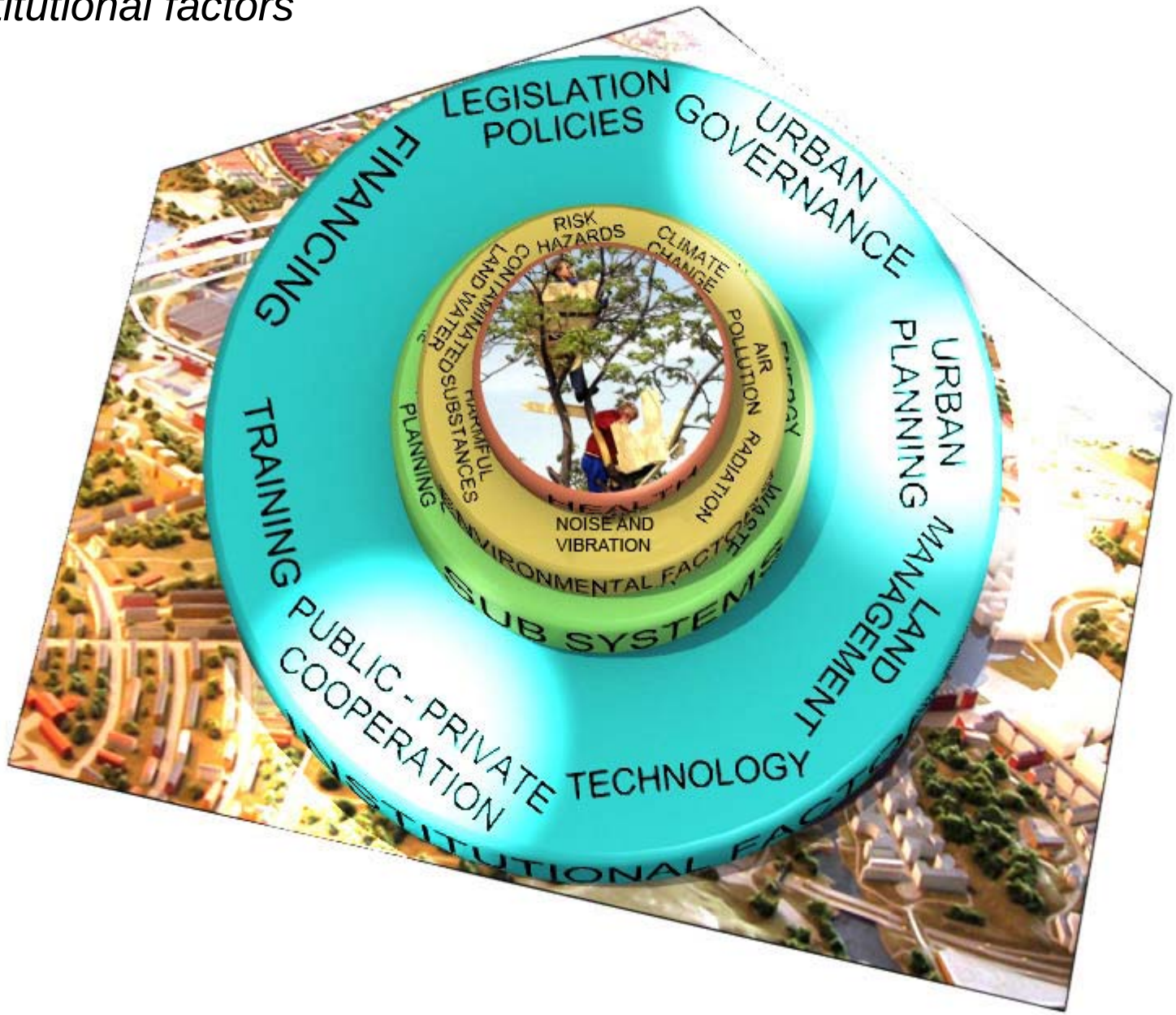


# ***The Conceptual Model*** *An integrated and multidisciplinary approach with focus on environmental factors in an urban context*



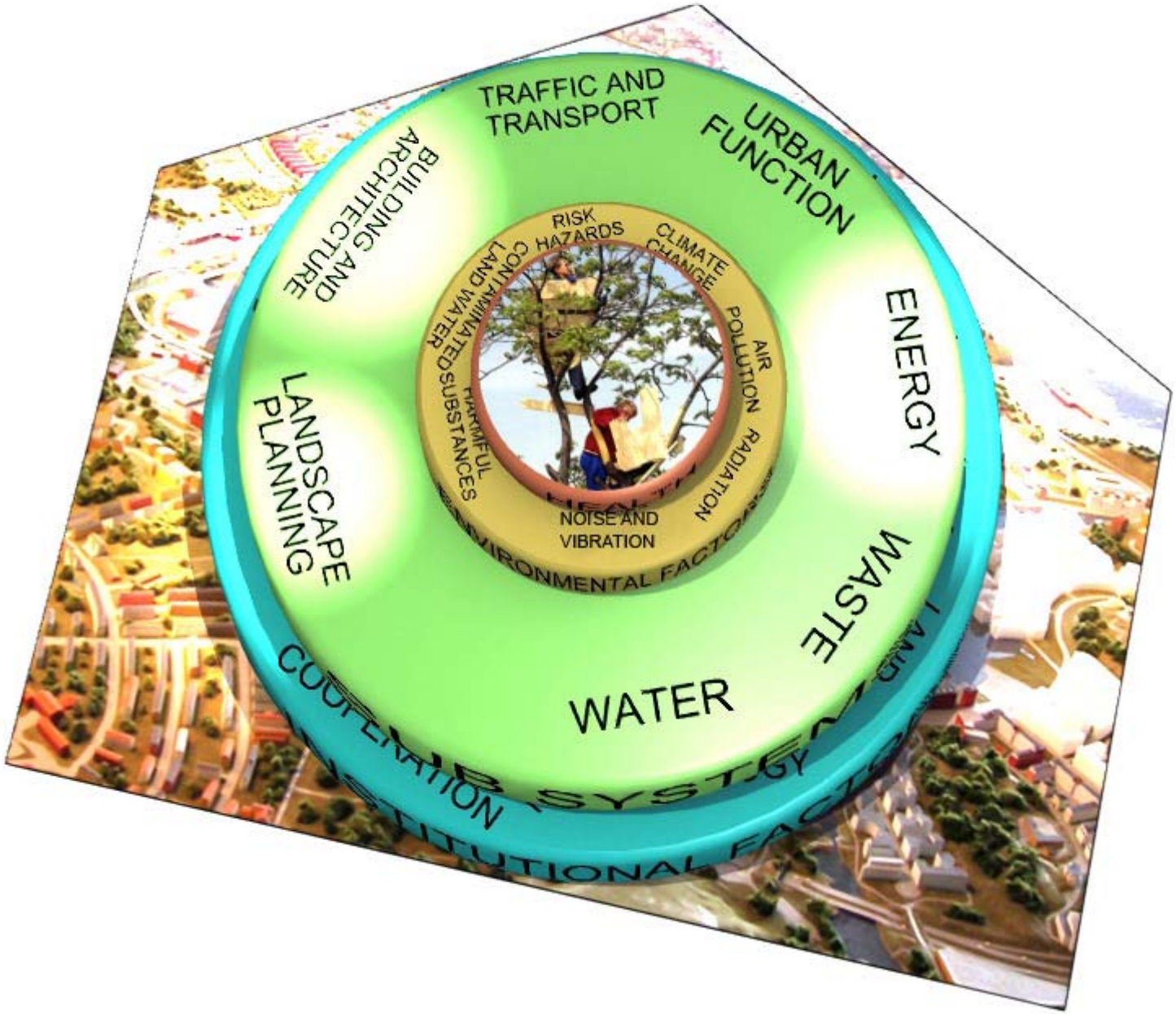
***Institutional factors***

*Highlighting urban planning, urban governance, public-private partnership and other institutional factors*

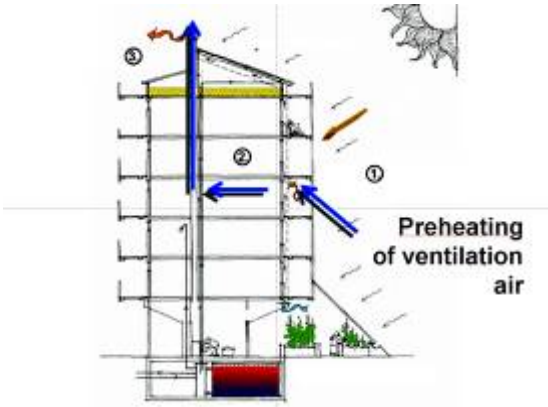


***Infrastructure systems (1)***

*Synergies between building design, landscape and energy*



***Planning of the city and its buildings with regard to sun and wind***




***Energy conscious design***

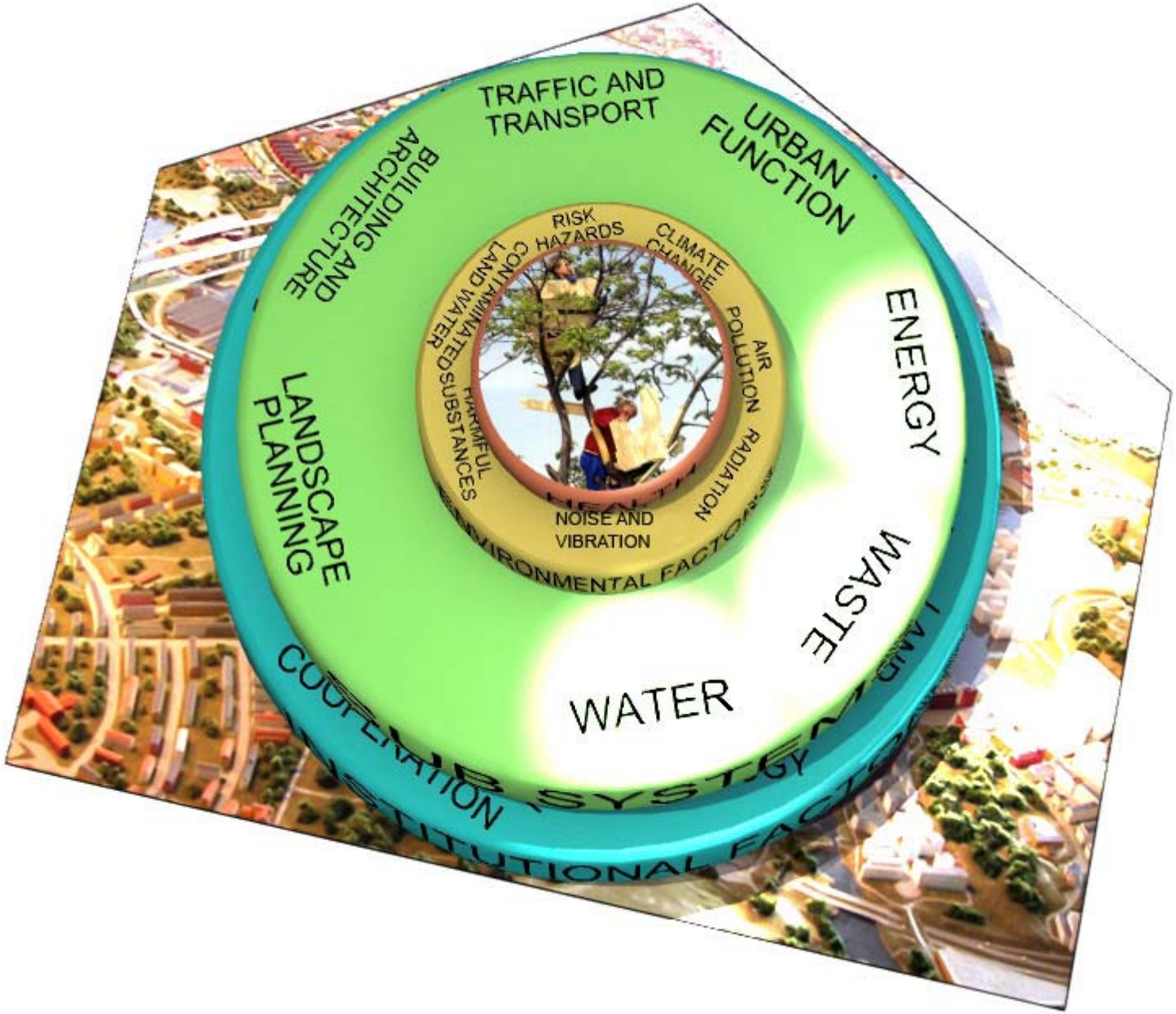
***Utilization of appropriate technology for obtaining low energy use***

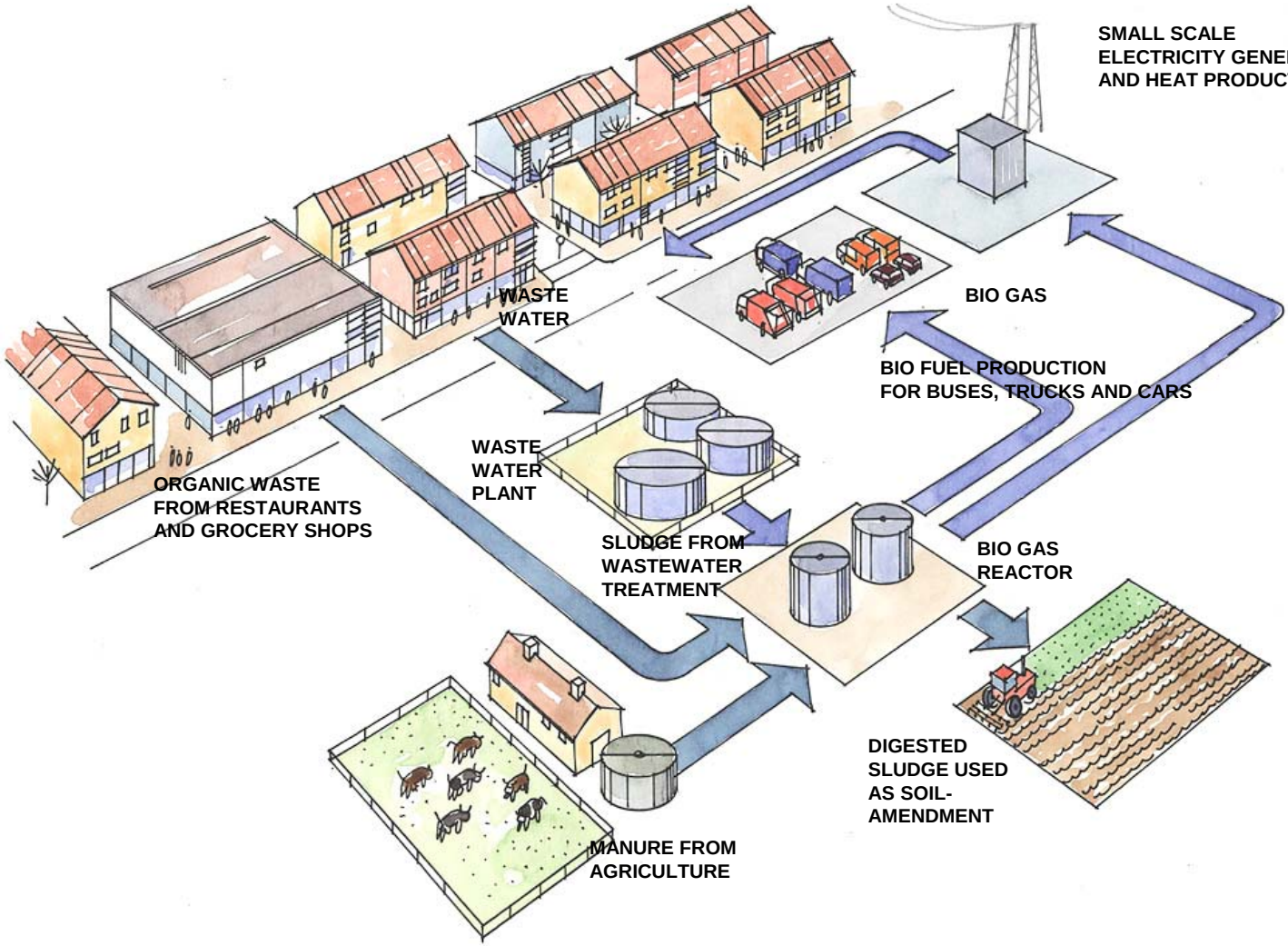
***Minimization of energy demand through architectural design – ”passive” buildings***

***Utilization of renewable energy sources – passive and active solar systems, wind power, geothermal***

***Infrastructure systems (2)***

*Synergies between energy, waste and water*

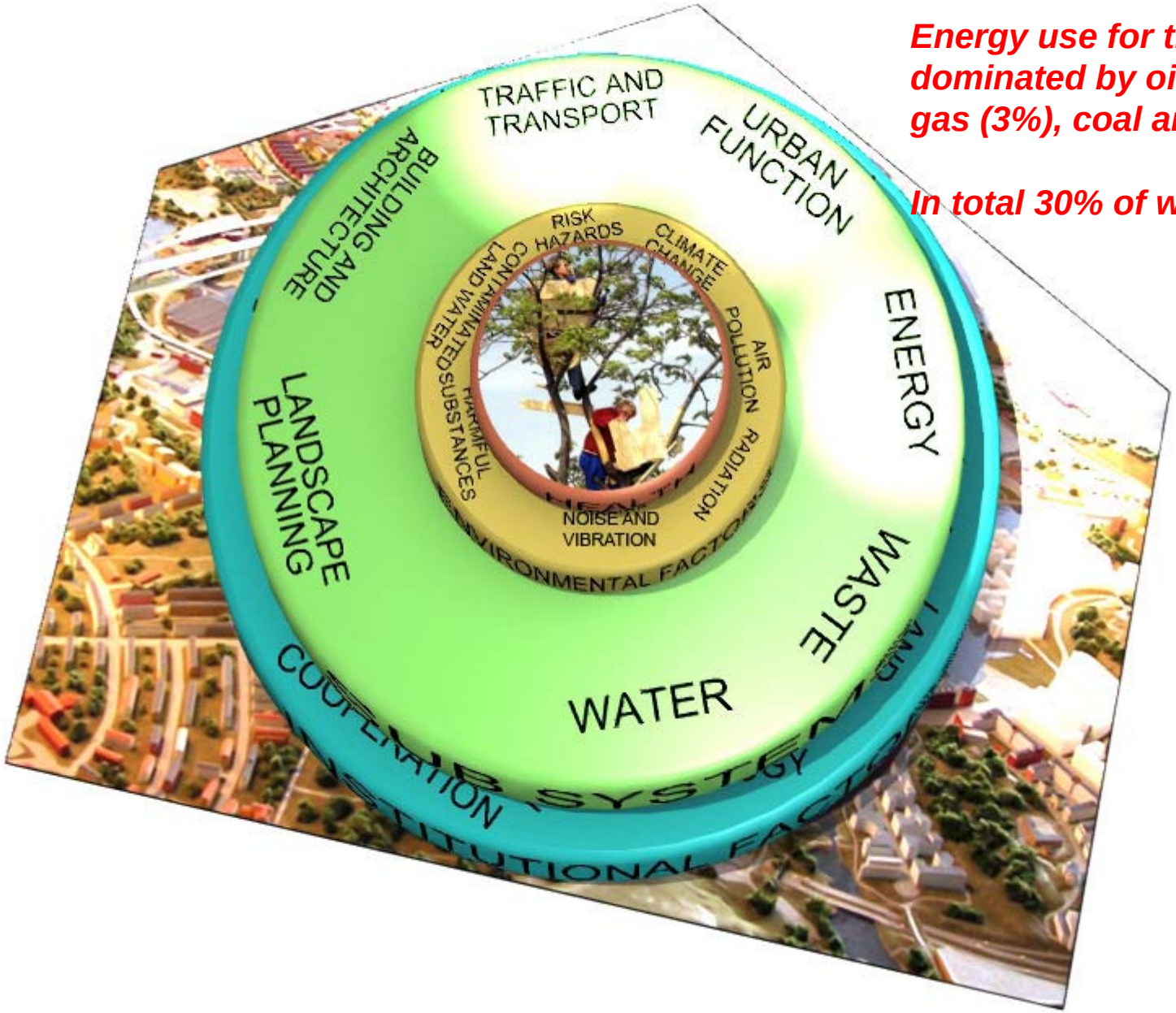





# INTEGRATED RESOURCES MANAGEMENT PRODUCTION OF BIOGAS FROM DIGESTED WASTE AND WASTE WATER SLUDGE SYNERGIES BETWEEN WATER & SEWAGE, WASTE AND ENERGY

## *structure systems (3)*

*ergies between transportation, urban functions/land-use and energy*




***Energy use for transportation is dominated by oil (95%), natural gas (3%), coal and electricity (2%).***

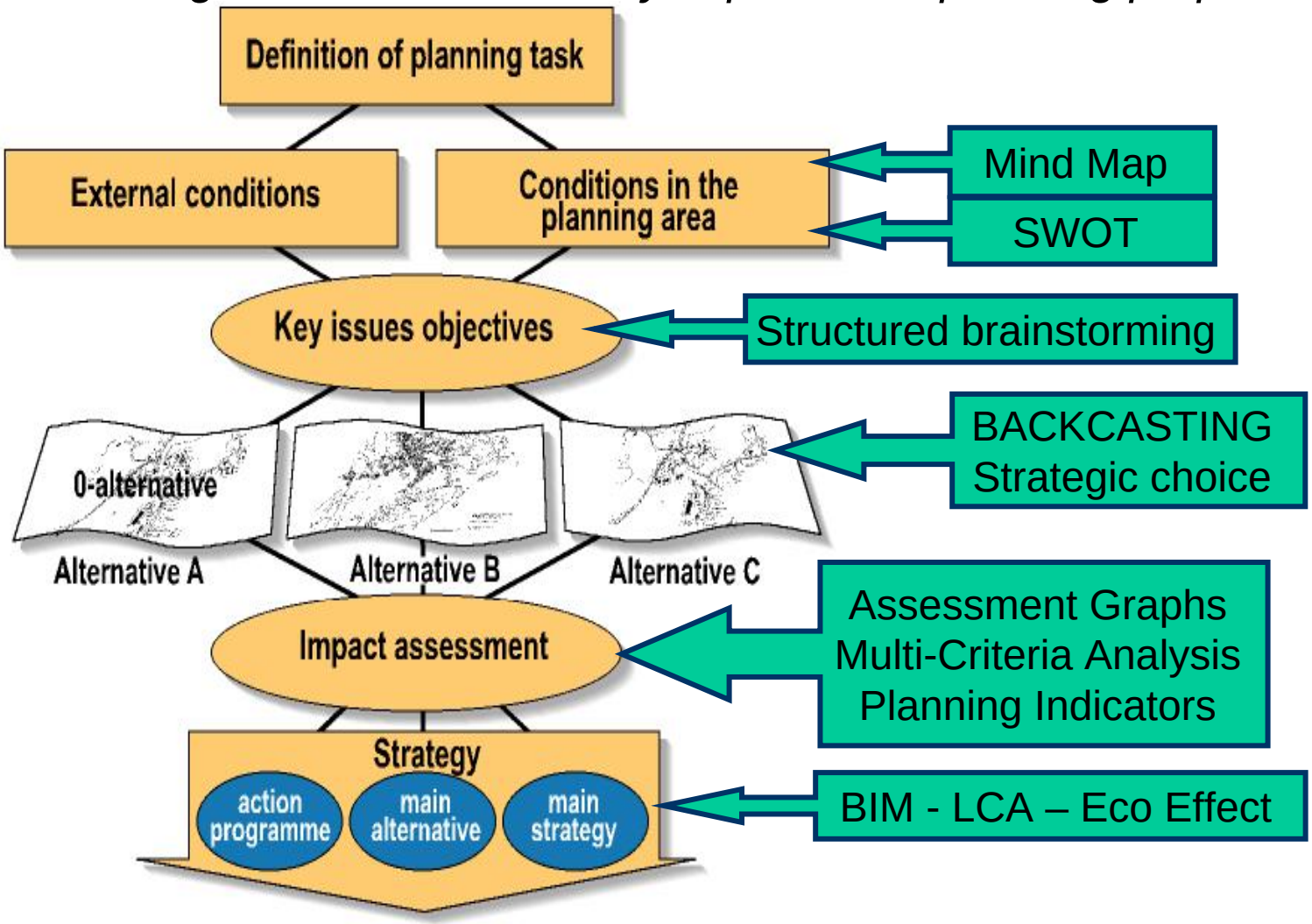
***In total 30% of world energy use.***

# *Sustainable transportation features – Hammarby sjöstad, Stockholm*

***Car pool with 45 environmental cars ( 350 households are associated)***

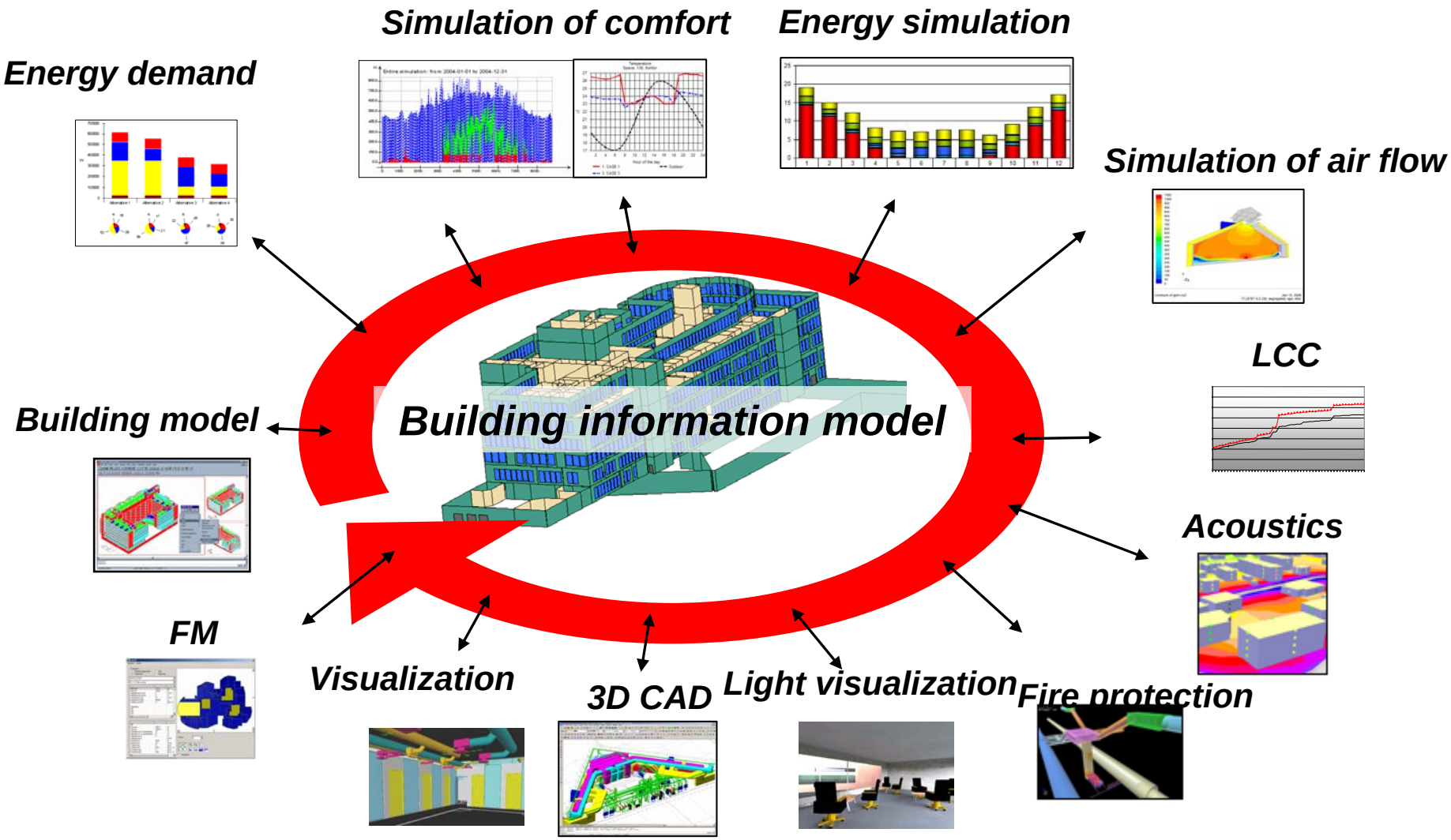
***Public transportation based on light-rail and biogas buses as well as a biogas fuelled ferry***

*A systematic working procedure supported by planning tools in order to promote the integration of sustainability aspects into planning proposals*




*Source: Sustainable community, R&D project phase 1, Swedish Energy Agency Swedish Environmental Protection Agency the SAMS-project*

# *Integrated tools for sustainble building design*




*Source: Gustav Jansson, SWECO Theorells*

***Vision & goals:***

***HOLISTIC APPROACH***

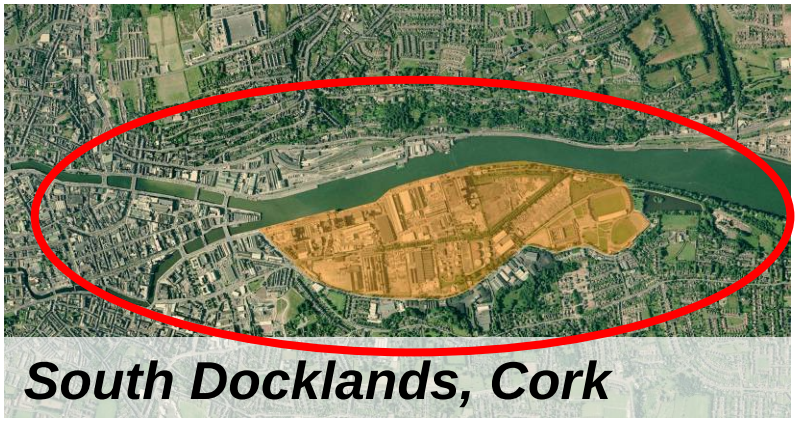
***Urban typolgy & design: "ECOLOGICAL" PLANNING***

- **Spatial** sustainability
- **Ecological sustainability**
- **Economical** sustainability
- **Social** sustainability

- Cultural heritage & local context
- Adoption to & respect for the site
- Resource effective layout
- **Economized transportation**
- Streetscape
- Functional integrated development
- **Greenscape & waterscape**
- ***ECO-CYCLE MODEL***

*Examples of integrated planning of "Model Cities" & Sustainability Reviews according to the Sustainable City concept*

**Toronto waterfront**



**South Docklands, Cork**

**Baltic Pearl**

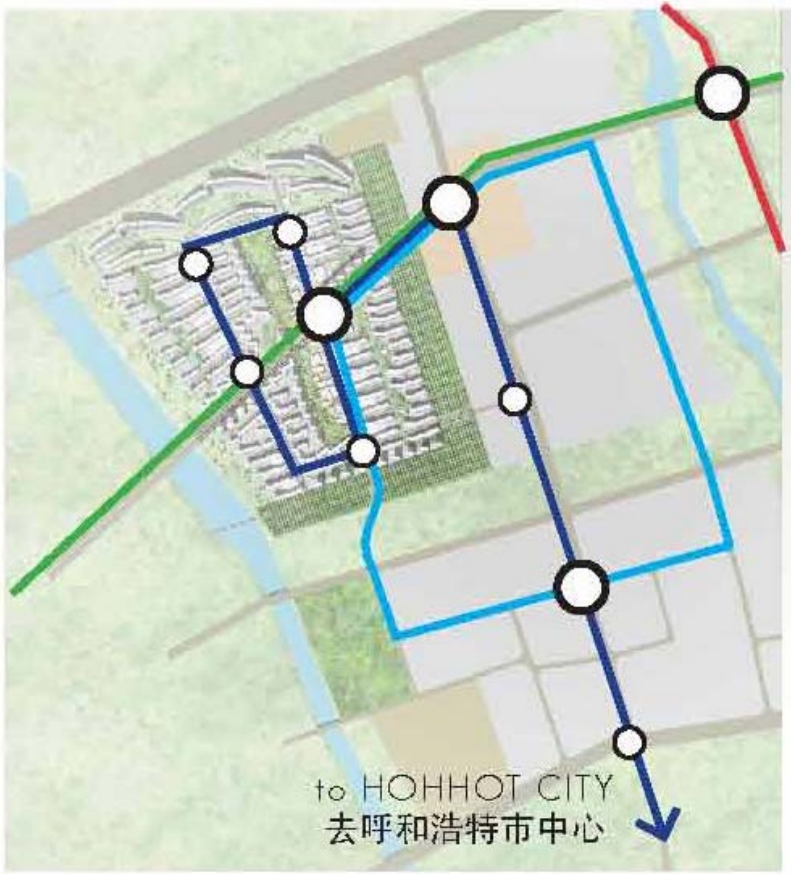

**Buffalo City**

**Luodian town**

**Dongli Lake**

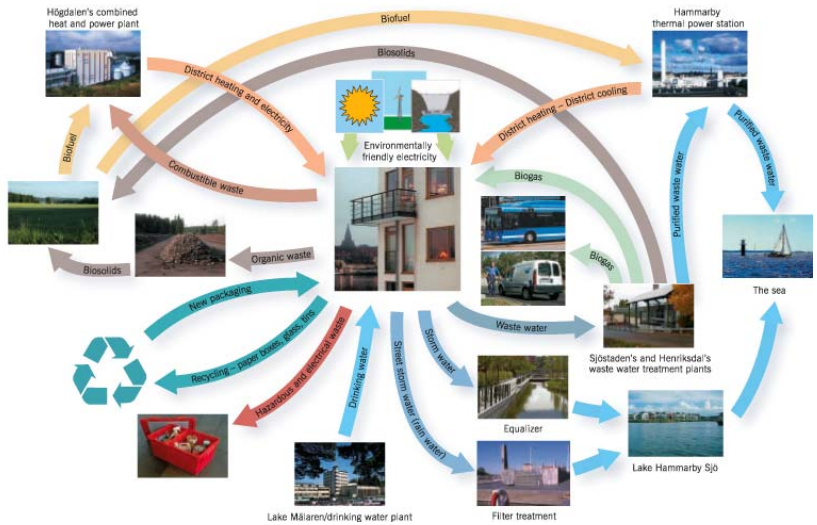
**Hohhot Wuhai**

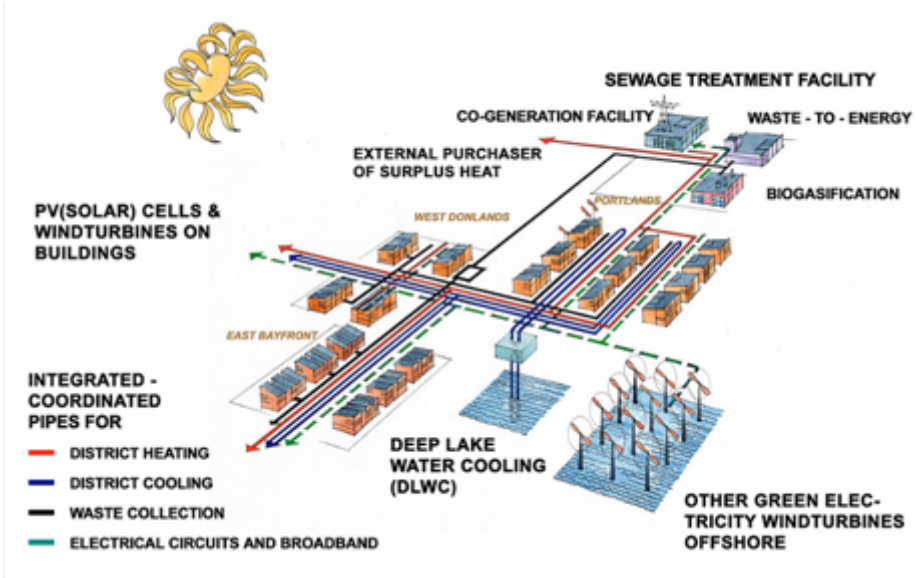

## 4.4 Landscape and water

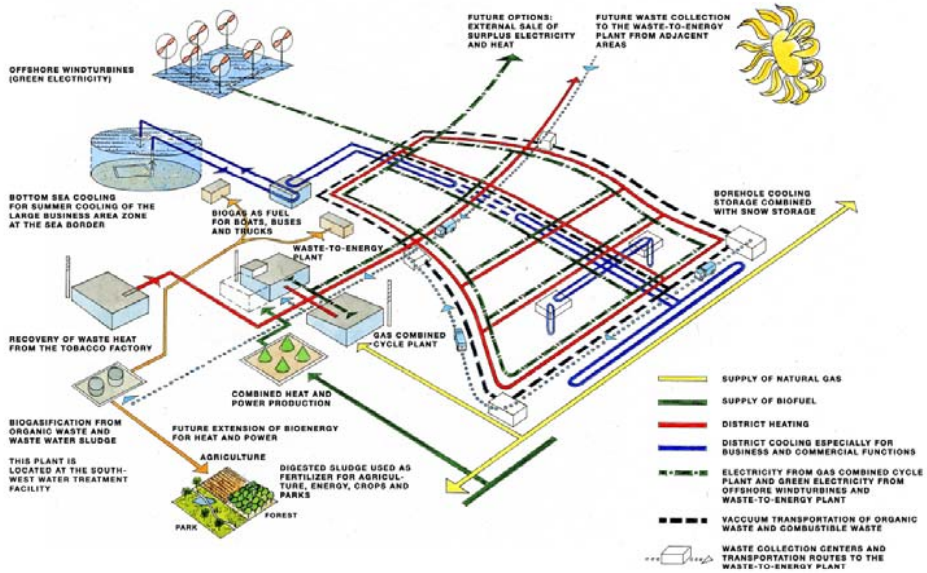

to HOHHOT CITY
去呼和浩特市中心

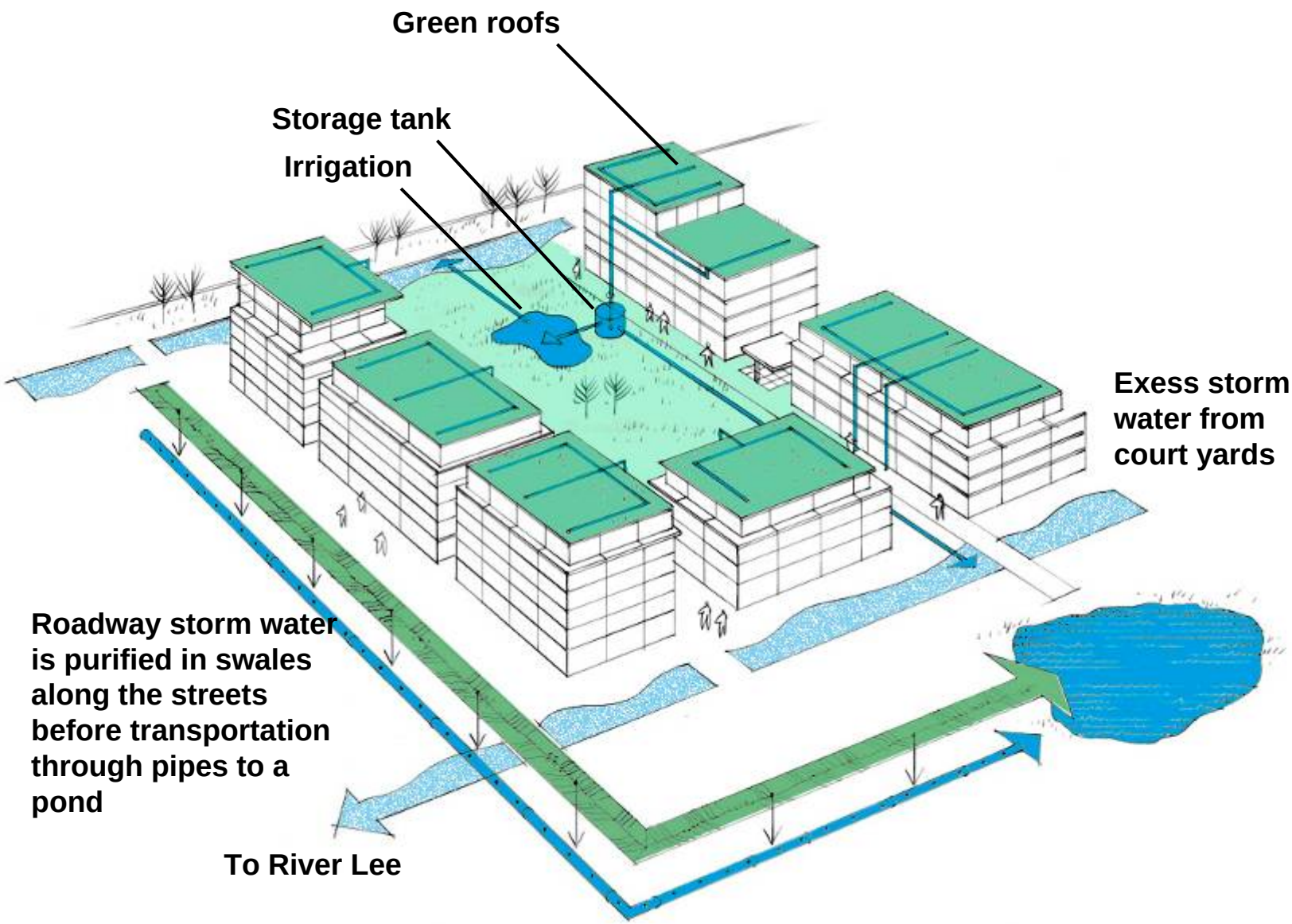

Legend
郊区公交线
Suburban line
“成吉思汗大街环城”公交线
Genghis Khan Road circle line
“绿城”公交线
"Green City" local circle line
去市中心快速公交线
Direct bus line to city center
主公交站
Major bus stop
次公交站
Bus stop

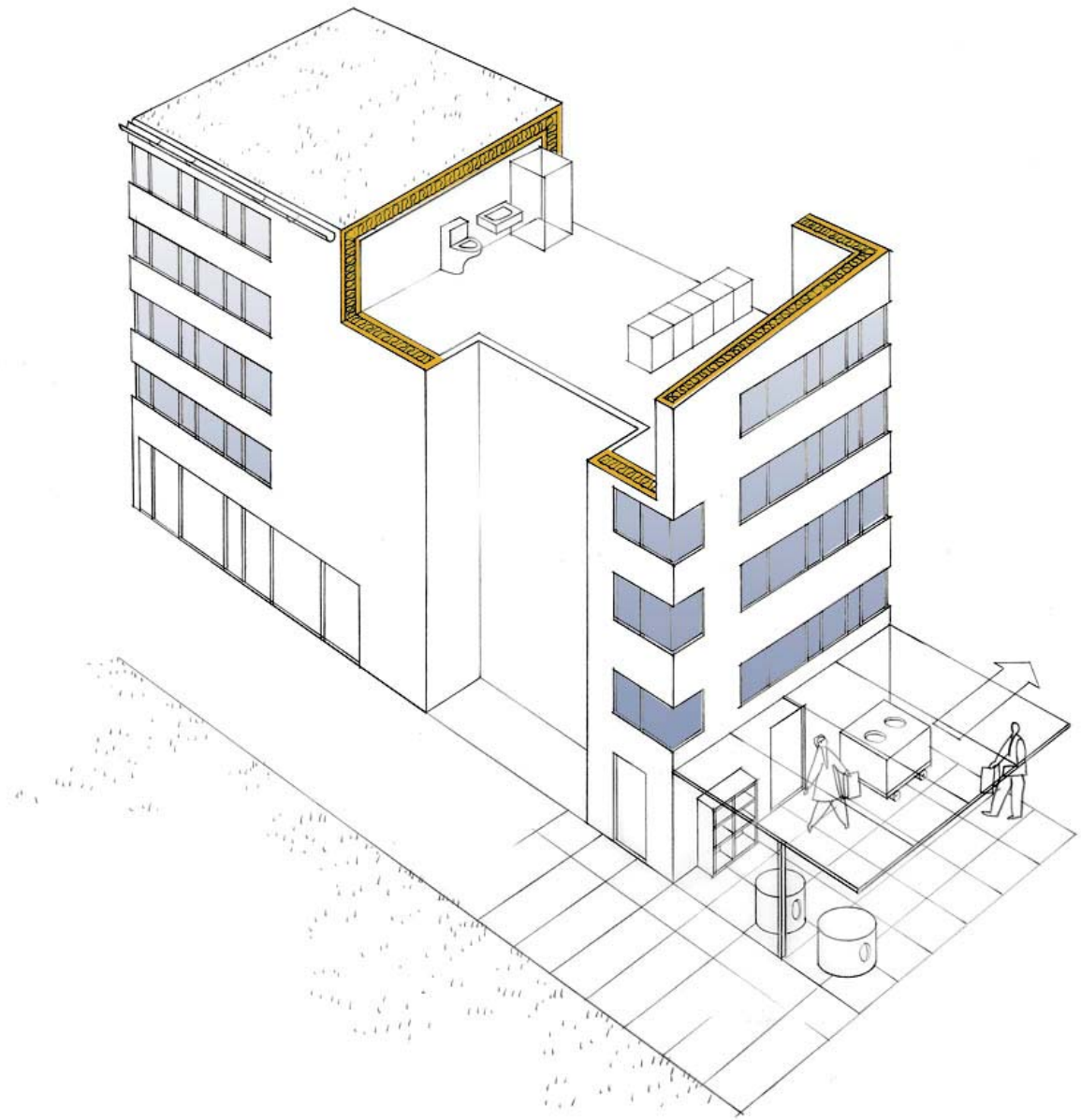
***The Eco-cycle Model***
*is an instrument*
*to understand, develop and communicate*
*sustainable urban development*
*and sustainable building design*




Green roofs
Storage tank
Irrigation
Exess storm water from court yards
Roadway storm water is purified in swales along the streets before transportation through pipes to a pond
To River Lee



**LOW ENERGY DEMAND**

High insulation of walls, windows and roofs, reduced cold bridges, airtight building envelope, controlled ventilation and heat exchange

**ENERGY SUPPLY**

Geothermal cooling and Low temperature heating

Comfort cooling (non-residential)

Heat pump: Hot tap water

Pre-heated ventilation air

Heat pump utilizing exhaust air for tap warm water and/or supply air (optional)

**WATER SUPPLY**

from city net

**BLACK WATER**

from wc and slurry from waste-disposer

**GREY WATER**

from bath and kitchen

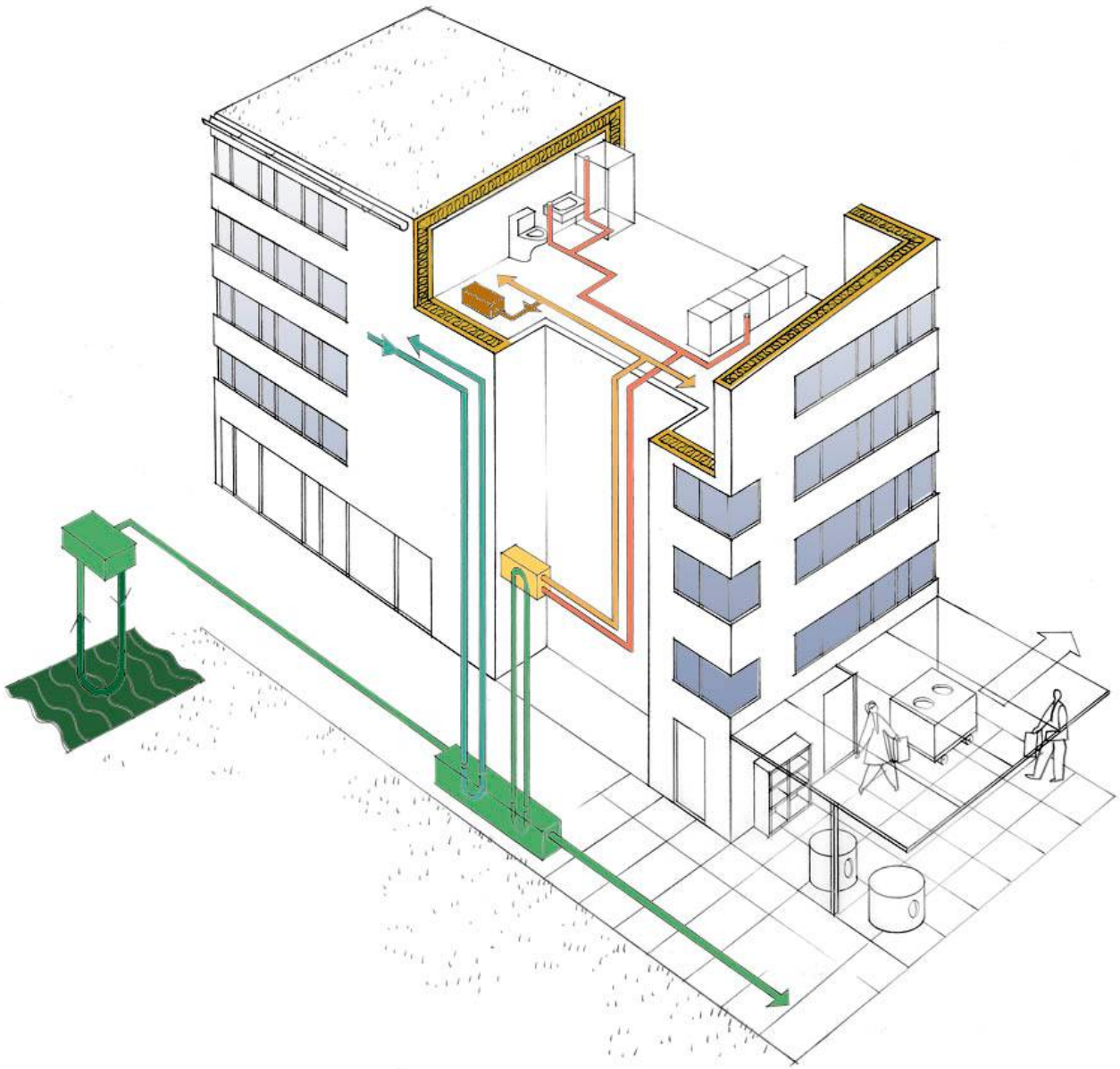
**STORM WATER**

Reuse for wc and dishwashers

**WASTE**

Vaccuum transportation

**ALL SYSTEMS**



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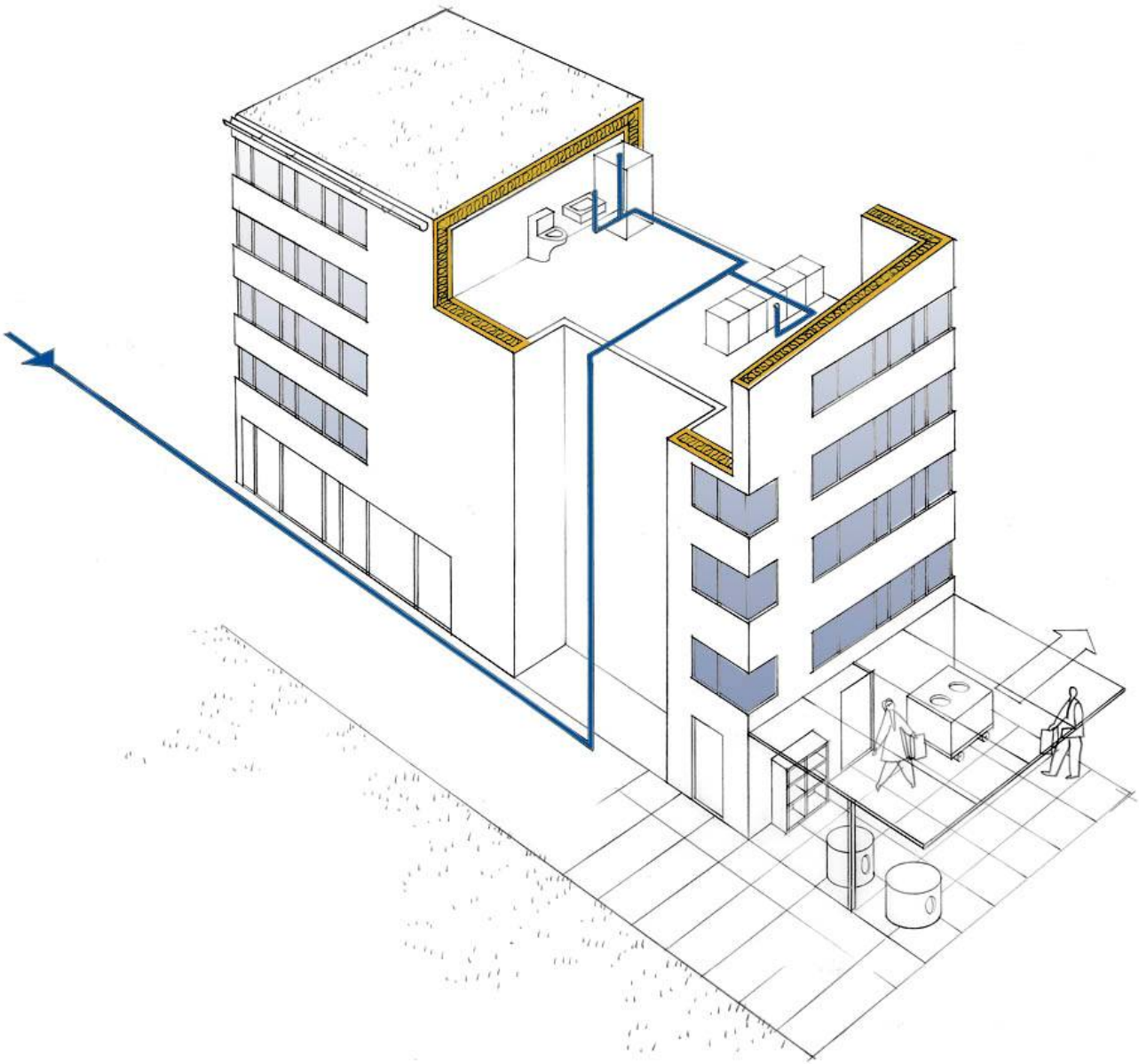

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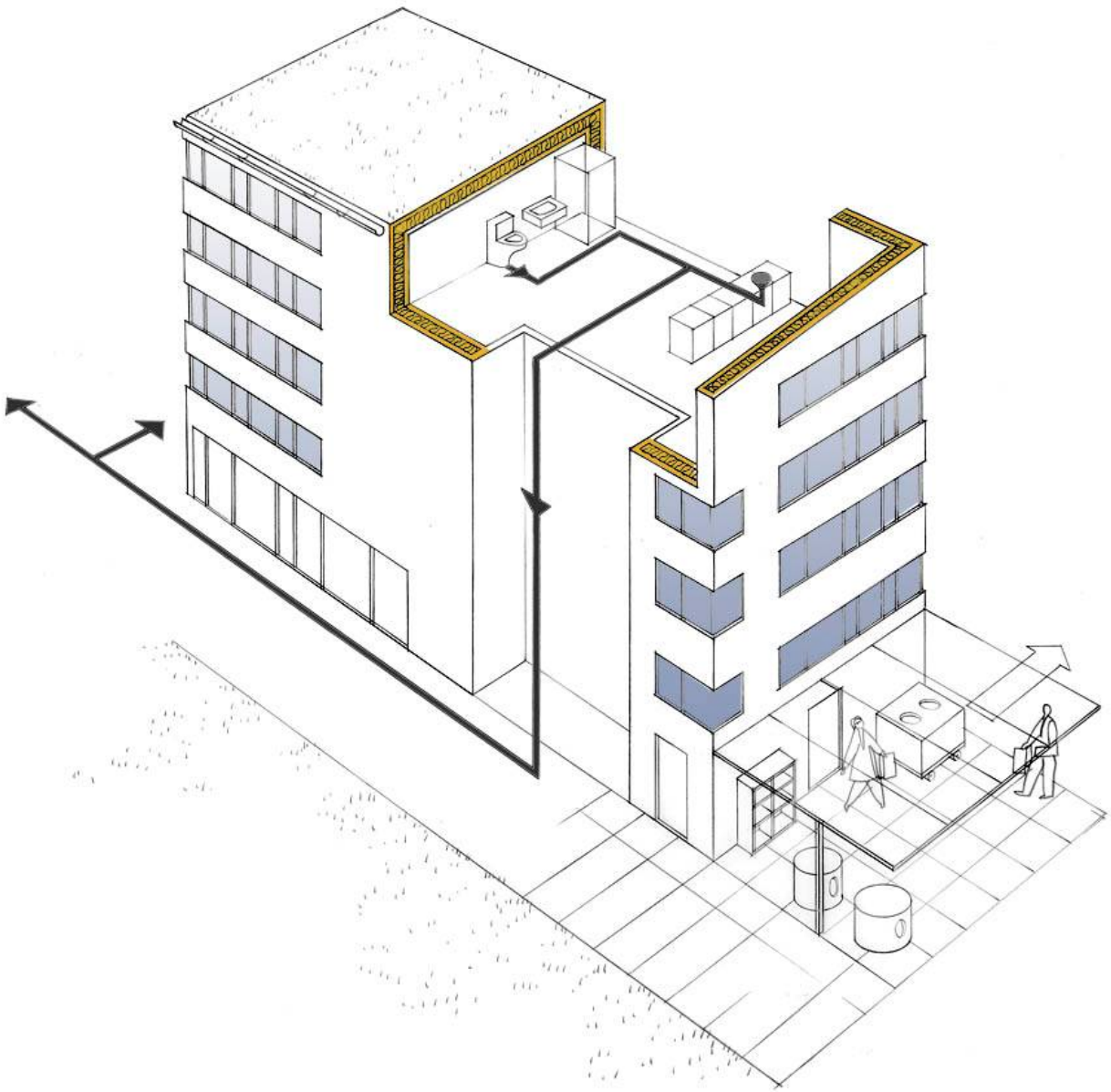

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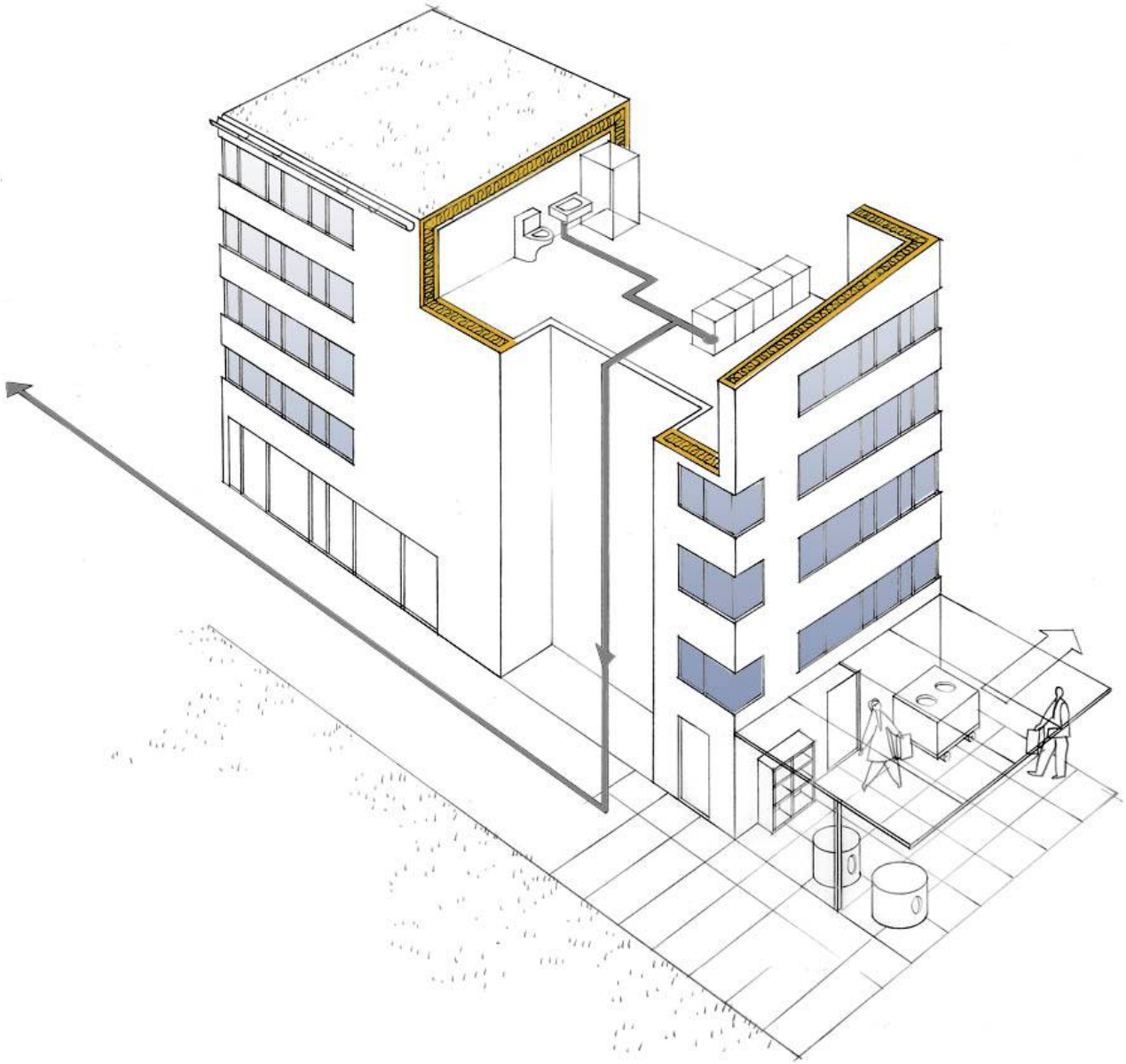

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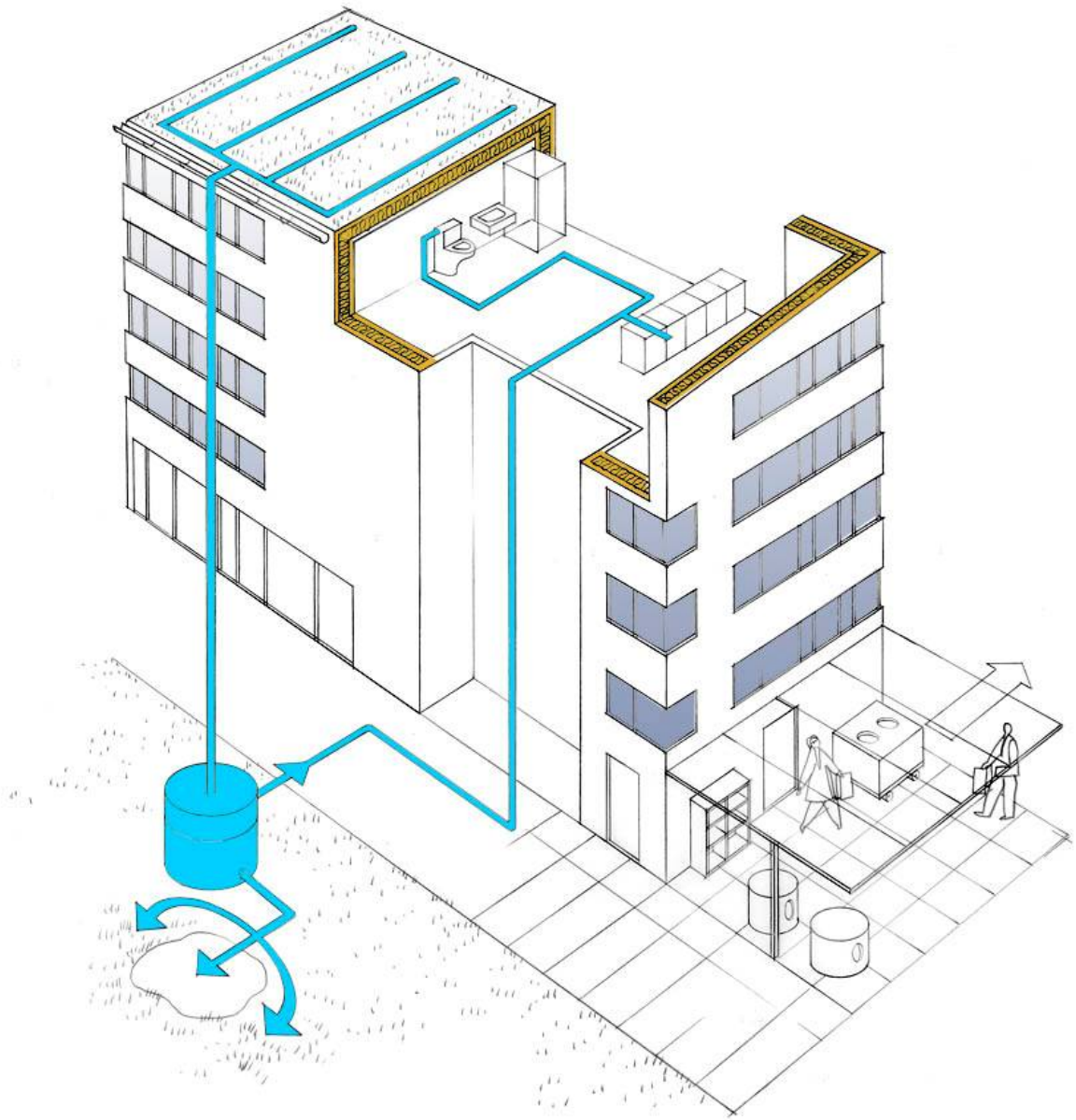

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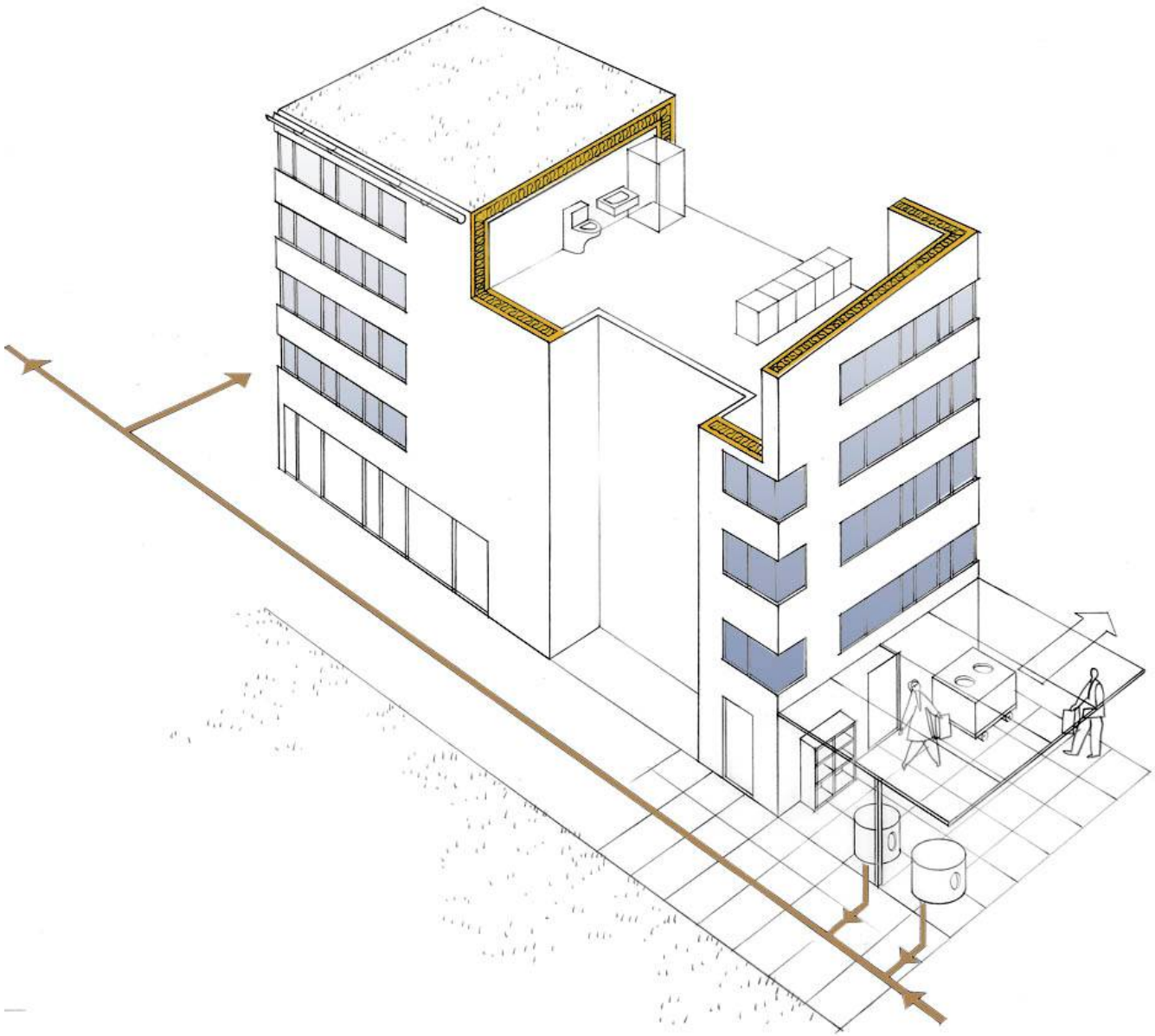

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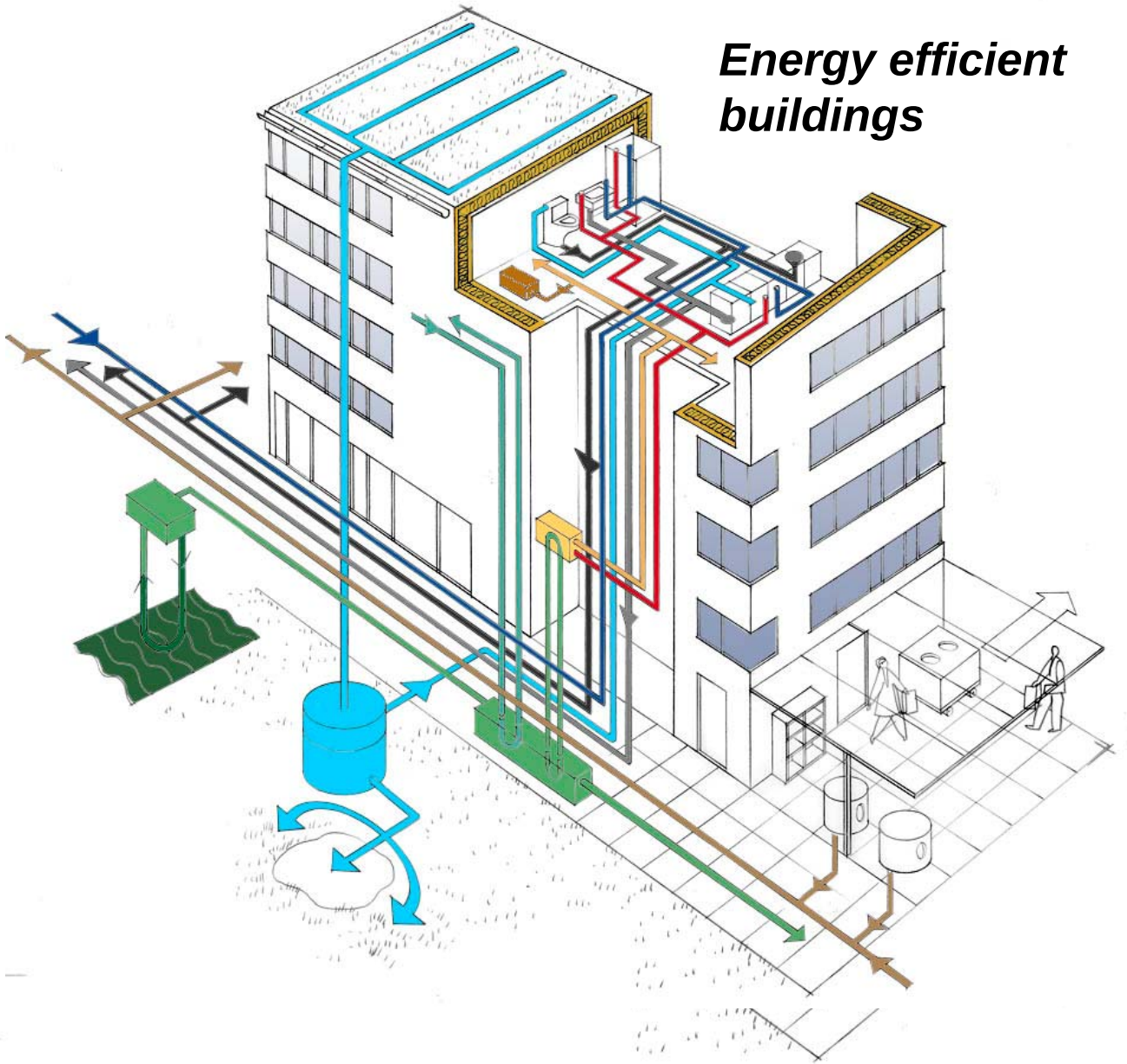
# *South Docklands, Cork – Eco-Cycle Model on **building level***




**BUILDING**

High insulation of walls, windows and roofs, reduced cold bridges, airtight building envelope, controlled ventilation and heat exchange

ENERGY

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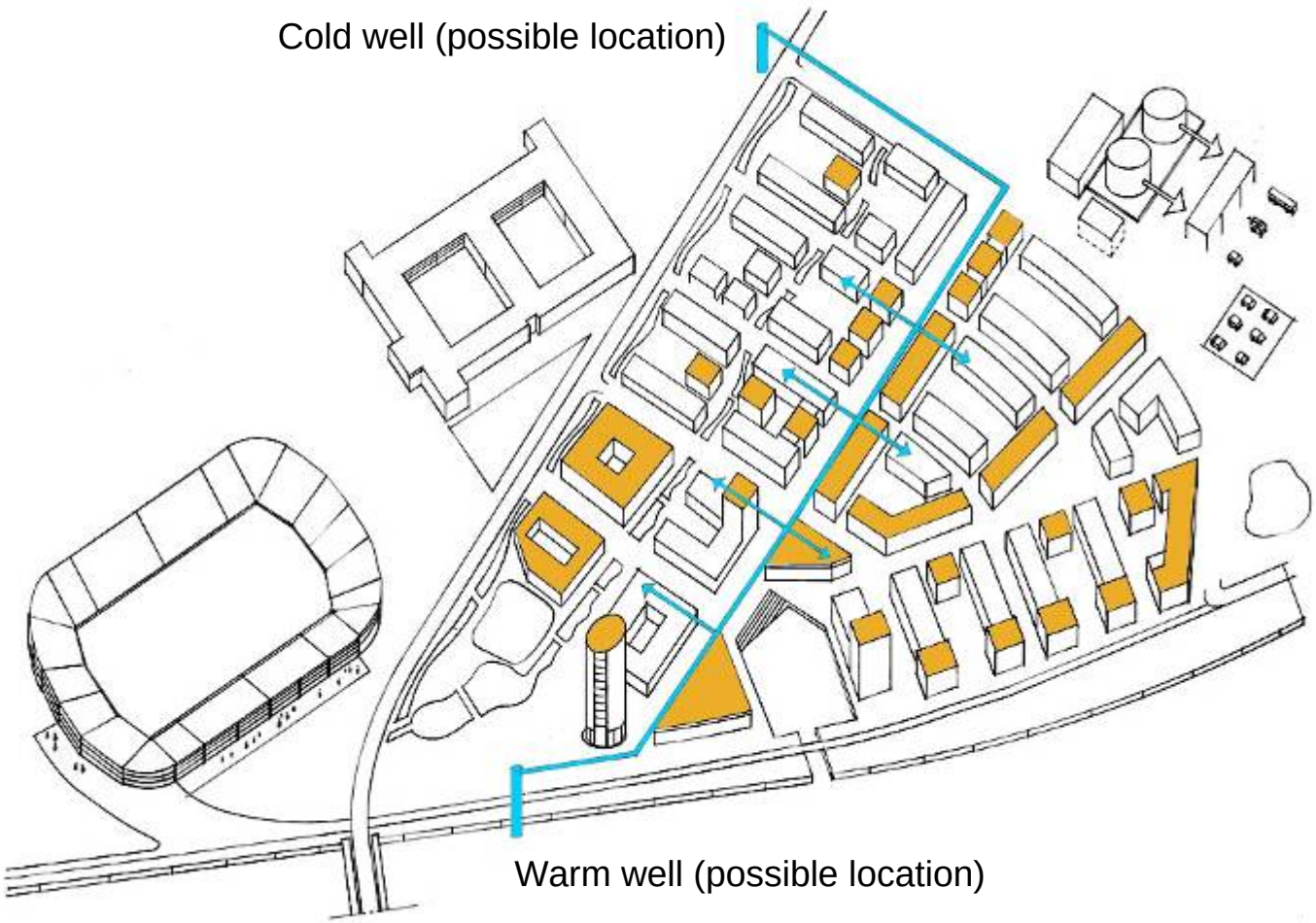
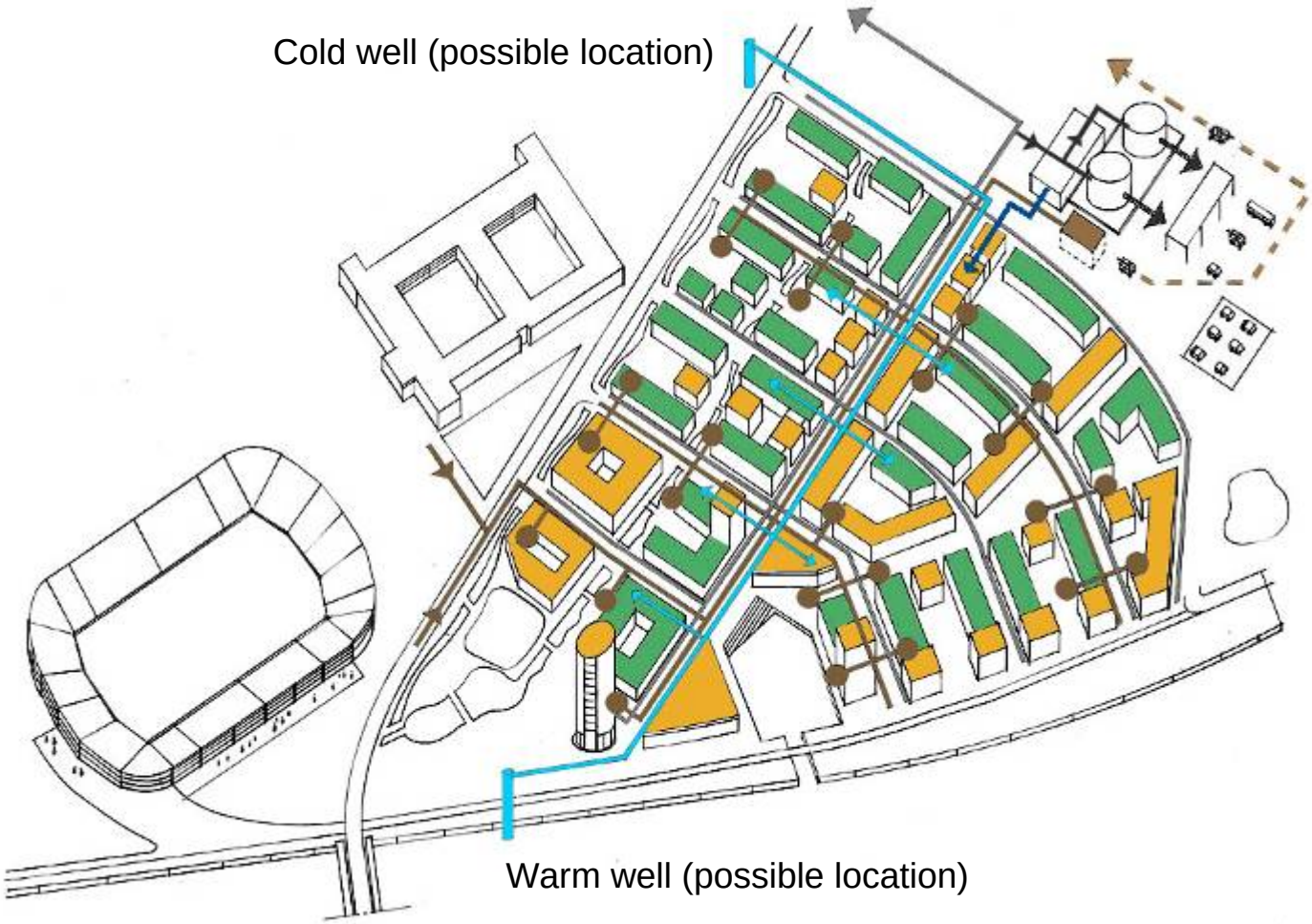
***Total external energy demand 30/50 kWh/sqm,year exclusive of individual electricity use***

## ENERGY SUPPLY

Distribution system for Geothermal cooling and low temperature heating.

Local electricity and heat production; PV-cells solar panel as an option






**ENERGY SUPPLY**

- Distribution system for Geothermal cooling and low temperature heating.
- Local electricity and heat production; PV-cells solar panel as an option

**WATER and WASTEWATER**

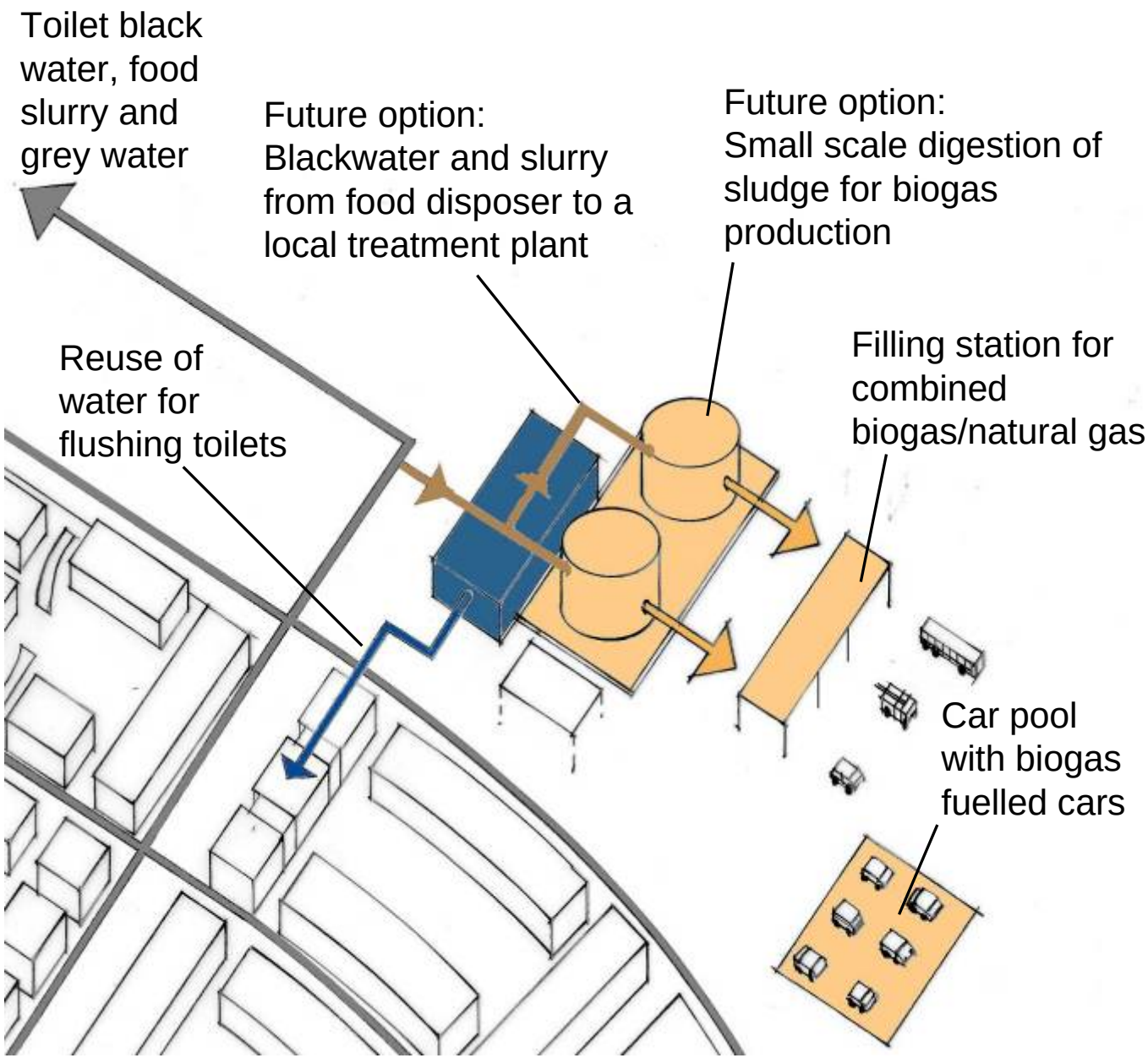
- Green roofs – storm water attenuation
- Pipe duct: Pipes for WC black water, food slurry and grey water
- Reuse of water for flushing of WCs

**WASTE**

- Local waste drop-off-points in each block
- Vaccuum transportation of waste

**ALL SYSTEMS**

**DETAIL**

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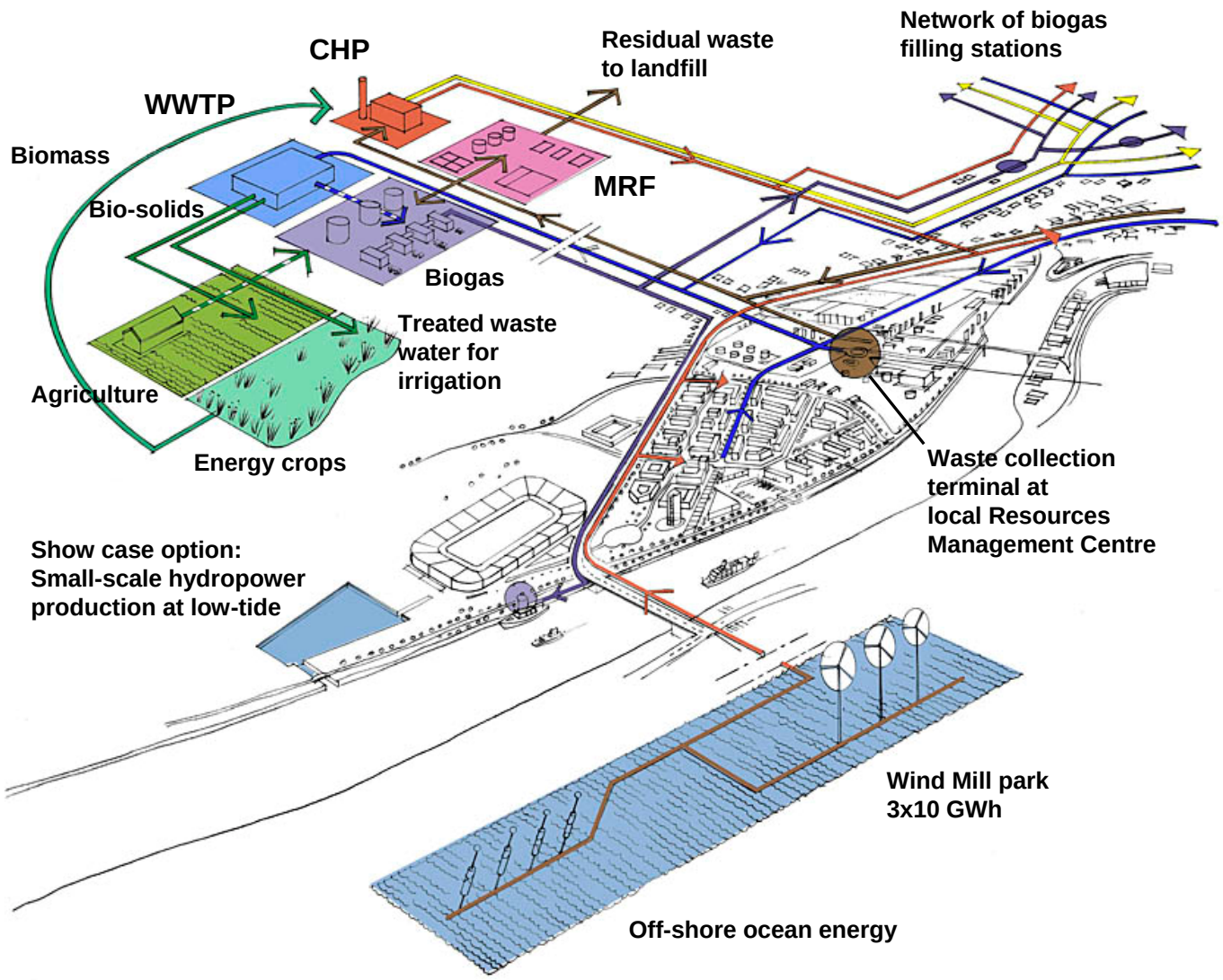
# *South Docklands, Cork – Eco-Cycle Model on **city level***




- Waste collection terminal at local Resources Management Centre to MRF (Materials Recycling Facility) and to CHP (Combined Heat and Power). Residual waste to landfill
- Pipe ducts for toilet black water, food slurry and grey water to WWTP (Waste Water Treatment Plant)
- Waste water sludge as source for biogas production
- Bio-solids to agriculture fertilization
- Manure from agriculture to biogas plant
- Biogas for heating and fuel
- Treated waste water for irrigation of energy crops
- Biomass to CHP for energy production
- District heating to existing Cork city building stock
- Electricity from CHP, from wind mill parks and from ocean energy

**ALL SYSTEMS**

# ***Expected benefits*** *of the Sustainable City Concept*

*Avoid suboptimization – economic benefits*

*75% reduction of external energy demand excl. individual electricity use and 100% renewable energy supply*

*Facilitate cooperation – sharing of knowledge*

”*Marry”our Swedish experiences with your experiences*

# ***Possible Applications*** *of the Sustainable City Concept*

*Sustainability reviews*

*Eco-cycle models and energy strategies*

*Integrated systems solutions on all urban scales*

*A Network of Model Sustainable Cities*

# *Thank You for Your Attention!*

*Vision without action is a daydream but*

*action without vision is a nightmare…….*

*The Sustainable City Concept forms a bridge between vision and action in the challenging task of transforming our cities !*

# *Contact details:*

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***Swedish Trade Council swedentech@swedishtrade.se***
***Webpage: www.swedentech.se***

***Power-point presentations and other Sustainable City presentations are available in pdf-format on webpage: www.sweco.se/suci***

***Sustainability Review for the Toronto Waterfront Revitalization Corporation is available as pdf-file on webpage www.towaterfront.com look into section "Sustainability"***

***Hammarby sjöstad: www.hammarbysjostad.se***