

Manual and Guidelines for Environmental Management in Housing Projects

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EGCN Training
Budapest,
21.06.2005.



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EGCN Training Model – Recommendations & Guidelines

Green City Dexamaf
www.greencity.dk



INPUT
(consumption)

Energy →

Raw material →

Water →

Physical surroundings →

BUILDING PROJECT



OUTPUT
(external and internal factors)

→ Emissions to the atmosphere (CO₂ etc.)

→ Noise

→ Vibrations

→ Change to the physical surroundings

→ Solid waste

→ Waste water

→ Emissions to soil

Environmental degrees of freedom

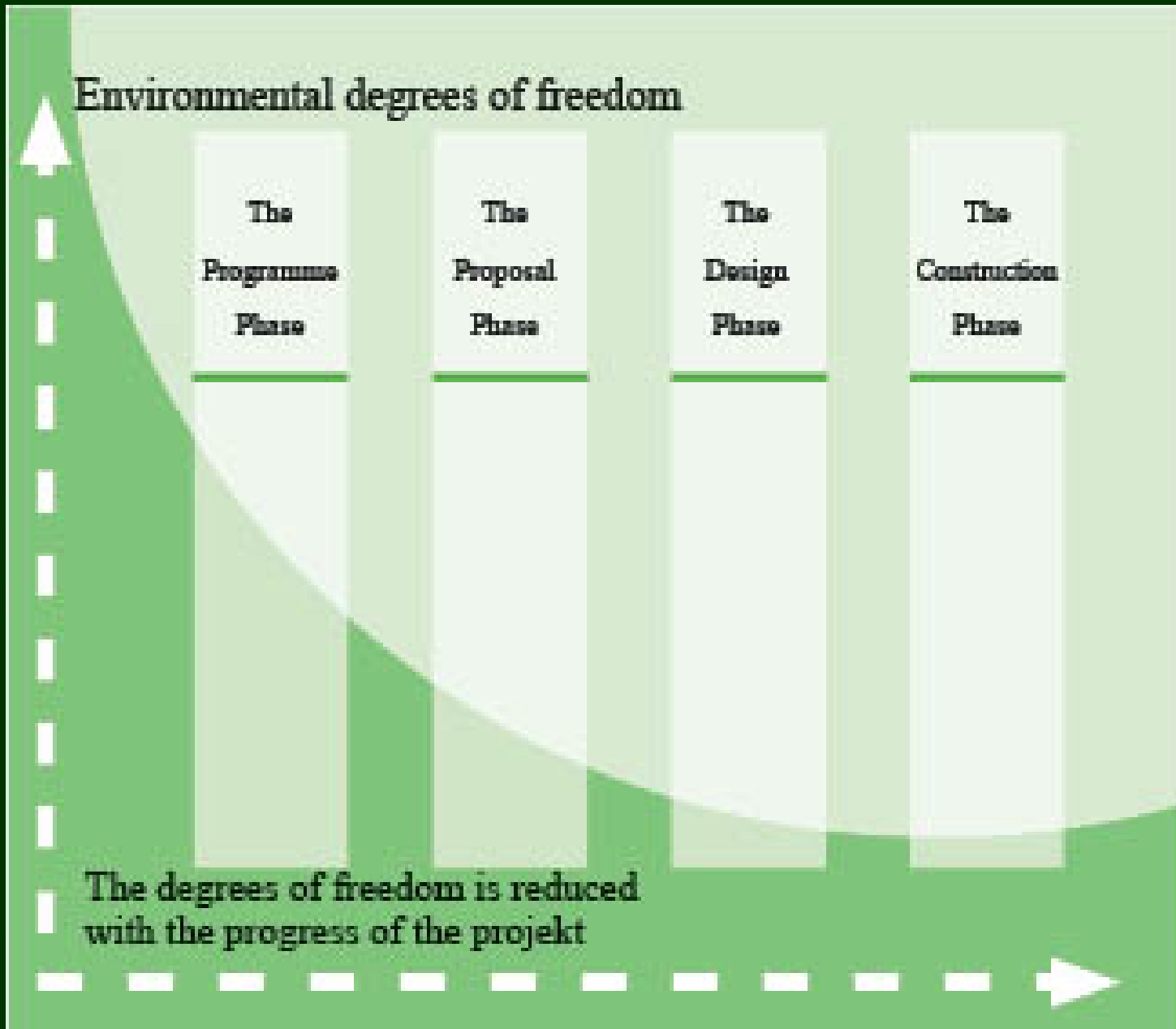
The
Programme
Phase

The
Proposal
Phase

The
Design
Phase

The
Construction
Phase

The degrees of freedom is reduced
with the progress of the projekt



From A to B to C

Step A: Which impacts are relevant?

Each of the four phases results in multiple environmental impacts. Listing the possible environmental impacts that are relevant in the specific project, across the four life cycle phases, produces an overall survey of the impacts.

Step B: Which ones are important? The next step is to determine which are the most important impacts to deal with. It is impossible to deal with everything. Focus on 5-10 significant issues. Impacts caused by energy consumption will almost always be significant, but many other impacts may be relevant.

Step C: Which solutions? The final step is to identify which of the preventative measures are relevant. By listing possible preventative and remedial measures, you get an overall survey of the possible solutions. This enables you to make the right decisions.

1. Site conditions

Possible impacts

Possible solutions

1.1 Conflicts with existing buildings which are of value?

- Utilise existing buildings or parts of the buildings.
- Use recycled building materials.

1.2 Impact on valuable existing natural elements?

- Avoid disturbing valuable views, habitats, trees, paths, streams etc.
- If disturbing then compensate.

1.3 Impact on valuable existing cultural elements?

- Avoid influencing or disturbing valuable cultural and/or historic elements.

1.4 Good or bad road access?

- Priority to different types of traffic.
- Traffic Plan for the entire area.

1.5 Good or bad public transportation? (Traffic is the main source of pollution in our European urban environment).

- Good conditions for bus transportation.
- Good conditions for train transportation.
- Good conditions for cyclists and pedestrians.

Possible impacts	Possible solutions
<p>1.6 What is the local electrical energy supply and how does the new project cause problems or benefits in this regard?</p>	<ul style="list-style-type: none"> ■ From the public grid? ■ What kind of energy source? ■ Alternative energy sources? Wind / photovoltaic energy, combined heat/power based on natural gas.
<p>1.7 What is the local heating supply and how does the new project cause problems or benefits in this regard?</p>	<ul style="list-style-type: none"> ■ District heating? ■ Local system? ■ What kind of energy source? ■ Alternative energy sources? Wind / solar / geothermal energy, bio energy, waste energy from industries, combined heat/power based on natural gas etc.
<p>1.8 What is the local fresh water supply, and how does the new project cause problems or benefits in this regard?</p>	<ul style="list-style-type: none"> ■ From the public supply? ■ Local system? ■ What quality?

Possible impacts

1.9 What is the local sewage system, and how does the new project cause problems or benefits in this regard?

1.10 How is the local rain water system, and does the new project cause problems or benefits in this relation?

1.11 What is the local waste system, and how does the new project cause problems or benefits in this regard?

Possible solutions

- To the public system?
- Separate sewage and rain water?
- Maybe a local system? Local treatment could be based on reed beds, aqua culture, small bio systems.

- To the public system?
- Separate sewage and rain water?
- Is a local system possible? A local system could mean recycling rain water for toilet flush, laundry, cleaning. Local filtration should also be considered.

- Separate at source?
- Recycling?
- Which future fractions?

2. Development plan

Possible impacts

Possible solutions

2.1 Can the energy consumption be reduced by a good orientation of buildings?

- Orientation +/-45° towards south for exploitation of the free energy from the sun.
- Other special building shapes.
- Reduce shadows from other buildings, trees and landscape.

2.2 Can the energy- and resource consumption be reduced by a compact shape?

- Compact shape to reduce area consumption, energy consumption and consumption of building materials for both houses, technical infrastructure and traffic system.
- Number of storeys.
- Row houses.
- Compact shape of every apartment.

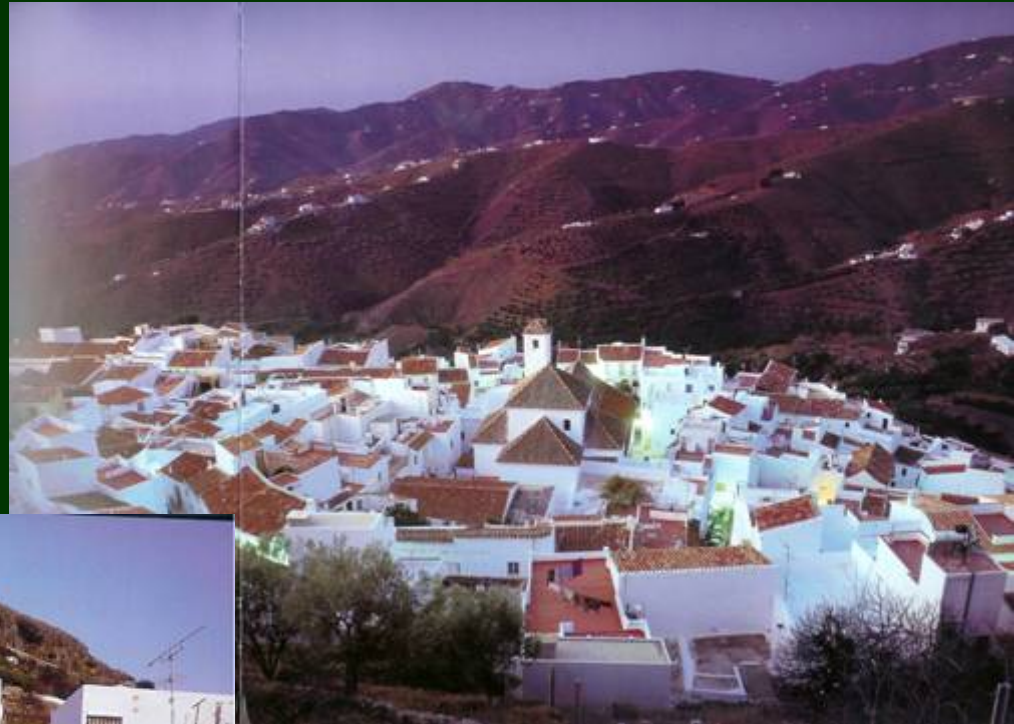
2.3 Can the impacts on the neighbourhood be reduced by good adaptation to existing buildings?

- Architecture, proportions, building materials, shadows, valuable views etc.

*Example 1:
Porvoo, Finland*



*Example 2:
Frigiliana, Spain*



Example 3:

Pécs, Hungary

Architect: Margit Pelényi



Possible impacts	Possible solutions
<p>2.4 Can the development plan be improved through flexibility? (durability)</p>	<ul style="list-style-type: none"> ■ Flexibility increases the qualities: More possibilities, higher utility value. More stable population. Lower costs when changing things in the future. ■ Different types of apartments in the neighbourhood. ■ Apartments that can be remodelled. ■ Units to be added to the houses. ■ Flexible shape of every apartment.
<p>2.5 Can the quality of the development plan be improved by integrating different urban functions? (Multi-rather than mono-functional).</p>	<ul style="list-style-type: none"> ■ Integration of urban function provides a more coherent life. Less transportation. ■ Living, working and recreation within the same area. ■ Functions can be changed responding to new demands.

Possible impacts

2.6 Can the social qualities of the development plan be improved through the project? (Or maybe reduced?).

2.7 Does the development plan reduce or improve security and confidence? (For residents and users).

Possible solutions

- Different types of apartments in the neighbourhood.
- Common facilities in the area.
- Spaces for play, sitting, meeting etc.
- More options, also when demands are changing. A more coherent life. Possible to have more generations living together. Improve quality of life conditions.

- Zoning/defining "ownership" of the areas.
- Easy to overview.
- Good lighting conditions.
- Good relations between neighbours.
- A more stable neighbourhood. Reduces the amount of vandalism etc. Positive social control.

Possible impacts

Possible solutions

2.8 Does the development plan reduce or increase wind speed and turbulence?

- Create shelter through varied development plan and plenty of trees/plants.
- Avoid wind tunnels and tall buildings.
- Reduce energy consumption and increase outdoor comfort.

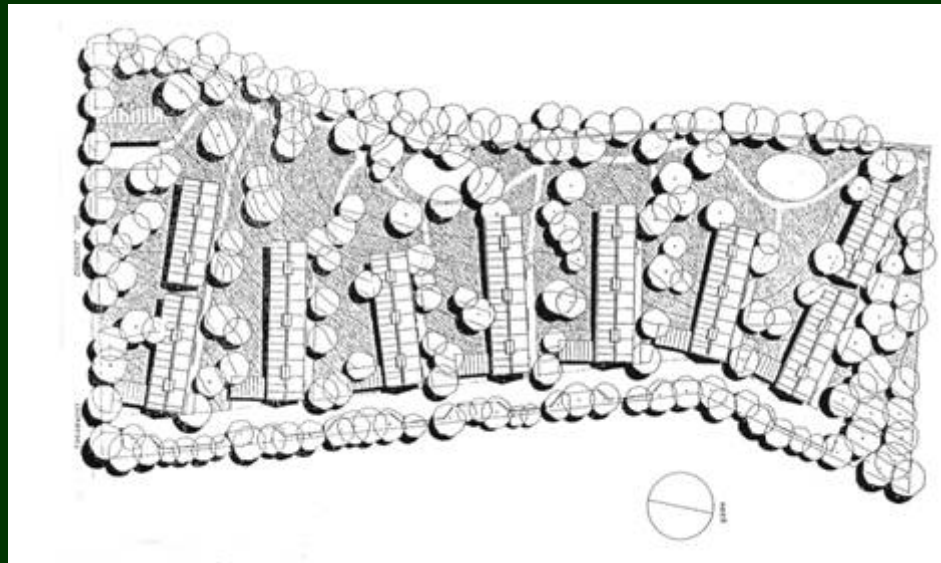
2.9 Does the development plan reduce or increase the areas of sealed surfaces?

- Reduce areas of streets, parking areas etc.
- Reduce consumption of building materials. Increase filtration of rainwater.

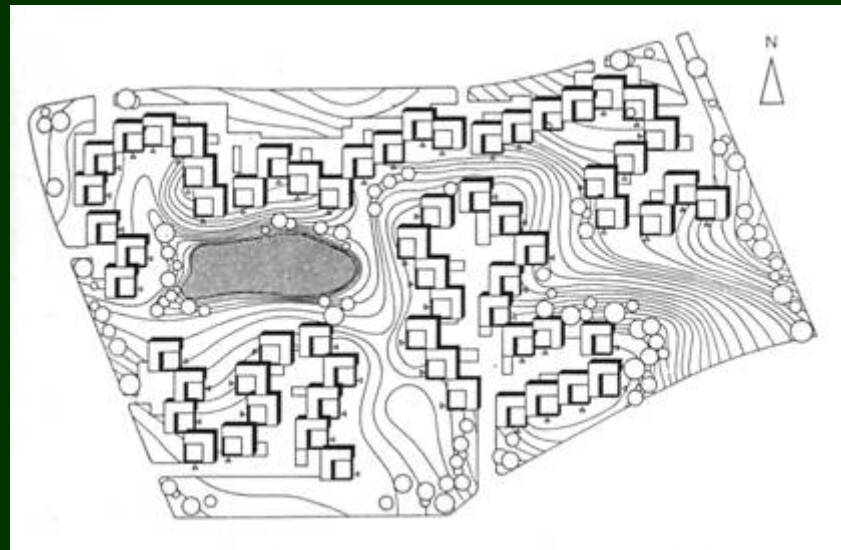
2.10 Does the development plan protect or destroy existing valuable natural elements?

- Avoid - as much as possible - affecting them.
- Recreate/replace. Many of these elements are irreplaceable and should be carefully protected.

Example 1:
Horsholm, Denmark
„Dianas Have“
Architect: Vandkunsten



Example 2:
Helsingor, Denmark
„Kingo houses”
Architect: Jorn Utzon



3. Planning the building etc.

Possible impacts

Possible solutions

3.1 Is the building of a high or poor quality? (High quality helps the environment. Lasts longer).

- Provide good architecture with:
- Functional, quality apartments.
- Good craftsmanship.

3.2 Are the possible impacts reduced through sustainable design?

- Use the methods of sustainable design. Methods are being developed right now in different ways. This manual is one of the methods. Other methods are far more complex (e.g. the Danish system for environmentally appropriate design, released 1998).

3.3 Are the possible impacts reduced through environmental control on building site?

- The contractors must follow a manual for environmental control (Less pollution from the process. Less waste. Fewer mistakes etc.)

Example 1:
Újpest, Hungary
„Swallow house”



*Example 2:
Budapest, Hungary*



Possible impacts

Possible solutions

3.4 Are the possible impacts reduced through environmentally sound operation of building?

- Information technology (CTS-system, automatic controls).
- Supervision / control.
- User friendly installations etc.

3.5 Is it possible to carry through an environmentally sound maintenance?

- Surface treatment (poison free).
- Easy maintenance and cleaning.
- Maintenance free materials.

3.6 Are the possible impacts reduced through user manuals for staff/professionals?

- Manual with special focus on the ecological questions.
- To be produced by the consultants.

Possible impacts	Possible solutions
3.7 Are the possible impacts reduced through education for staff?	<ul style="list-style-type: none">■ Staff to become familiar with the different parts of the project and must accept conditions.■ Education must be repeated from time to time.
3.8 Are the possible impacts reduced through a user manual for the residents?	<ul style="list-style-type: none">■ Residents have to become familiar with the different parts of the project and must accept conditions. The results of the project are highly dependent on the residents' behaviours.
3.9 Are the possible impacts reduced through instructions to the residents?	<ul style="list-style-type: none">■ Manual provided to all the residents. The result of the project depends on the behaviour of the residents.■ Special education offered to residents.■ Especially interested residents can be assigned special duties.

4. General design of the building

Possible impacts

Possible solutions

Building presentation:

4.1 Are the possible impacts from constructions reduced? Are the benefits utilised?

- Heavy construction in south zones.
- Light construction in north zones.
- Storing of surplus heat.
- Heat regulation.

4.2 Are the possible impacts from external walls reduced? Are the benefits utilised?

- Resource consumption etc. (See 5.)
- Climate adaptation. Wind, sun, rain etc.
- Materials. Environmental impacts, solar energy storage, durability, maintenance, insulation ability.
- Solar walls. Glazed wall with thermal mass or Trombe wall.
- Glass extensions. Towards south, southeast or southwest. Passive solar heat. Good indoor climate.
- Balconies/balcony coverage. Better living environment, insulating element. Possible to integrate photovoltaics.
- Front planting. Insulation element. Wall protection. Air purifying. Humidity. Habitat.

*Example 1:
Helsinki, Finland*



Possible impacts

4.3 Are the possible impacts from roof constructions reduced? Are the benefits utilised?

Possible solutions

- Materials. Environmental impacts. Maintenance.
- Water drainage. Collection for reuse in toilets, laundry, gardening watering.
- Possibility of solar collectors and photovoltaic panels. 30-70° roof gradient. Roofs oriented towards the sun.
- Exploitation of passive solar heat. Roof greenhouses. Glazing.

4.4 Are the possible impacts from windows reduced? Are the benefits utilised?

- Passive solar heat. Large south oriented windows.
- Exploitation of daylight. Electricity savings. Better indoor climate.
- Reduced heat loss. Low energy windows. Night shutters. Insulation curtains etc.
- Sun shades. Built-in venetian blinds. Canopies.

*Example 1:
Ballerup, Denmark*



Possible impacts

Possible solutions

Interior design:

4.5 Good flexibility through room division?

- Flexible rooms. Demand less changes.

4.6 Any benefits from climate zone division?

- Glass extensions. Protects against draft. Passive solar heat.
- Living rooms face south. Sun through the windows.
- Sleeping rooms and bathrooms face north. Coolness.

4.7 Any benefits from installations (electricity, pipes etc.)?

- Situation in building. In relation to resource consumption and heat loss.
- Separation of waste water.
- Access. Easy maintenance.

5. Building materials

Possible impacts

Possible solutions

5.1. Reduction of possible impacts through life cycle analysis ?

- Both the specific materials and the main construction should be chosen on the basis of LCA.

5.2 Resource and raw material consumption?

- Simply solution, few products
- High priority to local building material
- Raw materials
- Water consumption

5.3. Energy consumption?

- Extraction of raw material
- Production of building materials
- Transportation

Possible impacts	Possible solutions
5.4 Environmental impact? Landscape, health, dust, noise, accidents etc.	<ul style="list-style-type: none">■ Labelling. LCA. Declarations■ Recognised/approved materials■ Avoid dangerous substances■ Surface treatment,■ Noise reduction ability
5.5. Materials suitable for reuse/recycling?	<ul style="list-style-type: none">■ Repair possibilities. Replacement of single parts.■ Reusability. Separation of single parts■ Recycled materials■ Avoid directing to landfill
5.6. Lifetime	<ul style="list-style-type: none">■ Long term durability■ Maintenance■ Weathering, aging, patination

6. Indoor climate

Possible impacts

Possible solutions

6.1. Risk of poor air quality due to insufficient ventilation

- Permanent ventilation.
- Natural ventilation
- Mechanical ventilation
- Heat recovery
- Measy of maintenance

6.2. Risk of poor air quality due to impacts from materials?

- Dust, fibre dust. Avoid dusty materials and heavily textiled surfaces. Avoid places, where dust can collect.
- Poison free surface treatment.
- Radiation. Degassing. Radon. Vapour.

6.3. Risk of insufficient or pool cooling/heating?

- Avoid draught
- Avoid overheating
- Avoid

8. Water consumption in Buildings

Possible impacts

Possible solutions

8. 1. High consumption of Water ?

- Individual metering.
- Display consumption in every apartment. Increase consciousness.

8.2. Water consuming installations?

- Water saving toilets, showerstaps, washing machines, etc.
- Common laundry
- Separating toilets

8.3. Waste of rain water?

- For toilet flush
- For common laundry
- For cleaning/car wash
- For irrigation

Possible impacts

Possible solutions

8. 4. Can gray water be recycled ?

- For toilet flush
- For common laundry
- For cleaning/car wash
- For irrigation
- Individual metering.
- Needs cleaning in local system, e.g. plant based, biological

8.5. Can sewage be cleaned on site?

- For toilet flush, common laundry cleaning/car wash, irrigation filtration or sent to e.g. a stream
- Perspectives depend on the local conditions

8.6. Is separation of Waste water relevant?

- Separation of grey water and black water
- Increases the possibilities of diminishing water consumption

9. Waste and waste removal

Possible impacts

Possible solutions

9.1. Production of waste from construction works?

- Reduce material waste
- Return packaging to the producer
- Reuse of building
- Selective demolition
- Local reuse

9.2. Production of waste from household?

- Provide sufficient space in and near each apartment for separating at source
- Primarily in kitchen and immediate outdoors
- Locally placed environmental station
- Comfortable and well designed sites of waste containers

9.3. Workshops for repair and exchange of reusable goods?

- Common facilities
- Social aspects too

Possible impacts

Possible solutions

9.4. Production of organic waste from household?

- Individual composting
- Common in the neighbourhood
- Centralised public system
- For biogas, soil improvement or fertiliser
- From households and/or green areas?

Statements:

- Energy consciousness will improved by the introduction of EPD in the next year, however the financial background of the necessary development still not clear
- The national demonstration projects (SOLANOVA, DEMOHOUSE) should be get a high interest nationwide
- European Structural Funds gives financial background for improving district heating on renewable sources as biogas or biomass
- It is important to change the bad image of the district heating. Due to the over-subsidizing of natural gas, the price of the relatively high district heating cause a great problem for poor and lower middle class households
- High percentage of failures in new highly sealed windows without extra ventilation
- In Budapest the waste management there are little saying of Districts municipality, that makes barriers for local strategies, however selective waste collecting has some good practices here as well

Suggestions:

- Energy consumption on building and city level
- Application of renewable energy sources (solar and PV) in building and in energy plant, looking possibilities of Biomass and Biogas plants in districts of pherypheric
- Local CHP for blocks based on natural gas as demonstration projects
- Advanced district heating systems (one pipe, etc.)
- Environmental education in kindergarten and primary schools
- Raising public awareness on more sustainable water management
- Increasing daylight use by inner city circumstances
- Demonstration of PV operated ventilation for dwellings