BACKGROUND PAPER
Holistic Planning
For Energy Optimised Municipalities

FINAL

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INTENSE

Intelligent energy saving measures for municipal housing in Central and Eastern European countries

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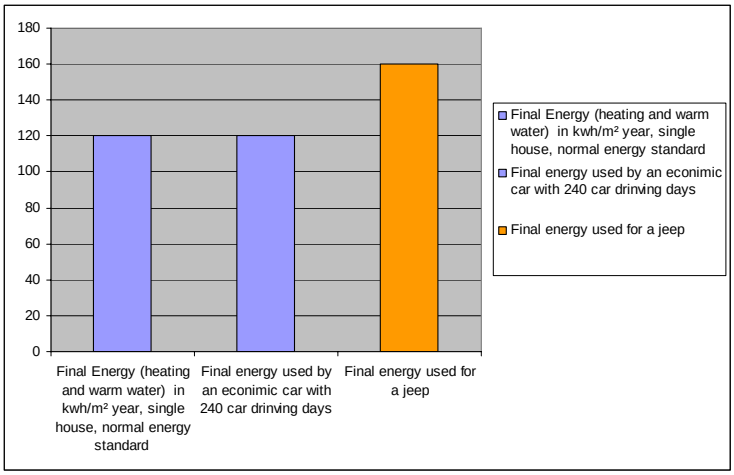
1 Introduction

The INTENSE survey for actual best practice examples of energy optimized in municipalities in CEE generated lists of very good examples of retrofitted houses in ownership of the municipality or retrofitted residential houses, where the municipality assisted to enforce the measure.
All these examples show the most urgent needs in CEE and so far they are very important. The goal of the survey was to identify best practice examples for energy optimised municipalities (case studies) but the key findings included retrofitting. We can conclude that the main present aspect of energy efficiency in municipal housing in CEE is retrofitting, and not the holistic urban planning.

But nevertheless, holistic housing planning is more than comparing the consumption of energy before and after the implementation of energy efficiency measures. Municipalities have broader duties as to maintain their own shrunken building stock.

Figure 0: Building activities in the green belts round the cities (Photo: Dirk Schröder-Brandi).

Building activities are ongoing, detached houses are growing mushroom like in the green belts round the big cities. A simple calculation shows the current approach: even if these new buildings will fulfill a high energy standard, high energy consumption can be estimated for the daily transportation needs. Is there a possibility for municipalities to influence activities of private investors in a way to take holistic components, i.e. more then energy standard of the house into account?



Source: Auraplan.

This question is related in this case to the planning obligations and planning culture of 12 different countries: Bulgaria, Croatia, Czech Republic, Estonia, Latvia, Lithuania, Germany, Hungary, Poland, Romania, Slovakia, and Slovenia with different historical background.

The main task of this paper is to discuss some basic ideas of urban planning related to energy consumption and to show how classical planning ideas or instruments can be used for energy optimized municipalities. It is addressed mainly to planners in CEE municipalities.

The core part of the paper is a bundle of best practice examples of German municipalities with a list of common planning instruments used with intention of energy related urban planning. German best practice examples will be introduced by a historical chapter with some general aspects of urban development and increased consumption of fossil energy.
For a better understanding of this special planning culture you will find the chapter about the urban development in Hamburg.

The text is completed with some preliminary ideas of adaptation possibilities in CEE. Our intention is to provide guidelines to the challenge: What can CEE municipalities do to influence the behavior of private investors towards energy optimized municipality?

2 Coke town, fossil town

2.1 Urban development and the increasing consumption of fossil energy

Figure 1: Overcrowded streets and smoke emerging from the factories near living places, as typical situation in early days of industrial revolution (pictures by using engravings of Gustave Doré 1872 and of 1840).

Coke town is not a place to find on a map of England, it is a place to read about in Charles Dickens´ novel "Hard Times"[1]. It is a prototype of the mid 19th century town, faced with the new challenges of the industrial revolution. These big changes started in England in the late 18th century and were in process in the 19th century. We can picture an insane place with its narrow streets, small, overcrowded houses and accompanying social problems. The production processes in industry had been rationalized, but not the way to build hundreds of flats for the workers. It is a place with increasing fossil energy consumption. The consumption of fossil energy is visible everywhere; smoke is emerging of the factories and coats all facades in black.
The inhabitants of coke town were no big energy consumers themselves; their average living space was incredibly small. They also did not use energy for transportation, they just walked.

[1] Charles Dickens, Hard Times, 1854

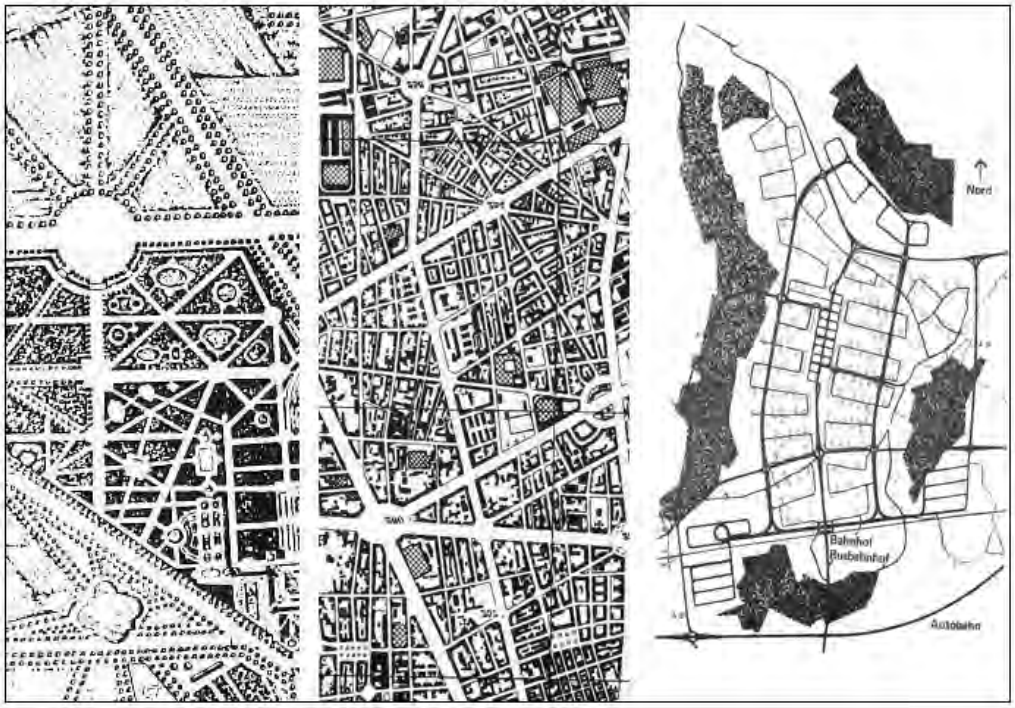


Figure 2: Parts of maps of Versailles and Turin shows axis and places as important elements, no matter if they have to structure a park or a town. In contrary, the example of Hook, England, that was not realized, shows the importance of different functions: streets for traffic and paths for pedestrians, living quarters in the centre and industrial areas north and south (Pictures using map of Pierre Le Pautre for Versailles, military map for Turin, scheme for Hook).

The industrial revolution set new tasks for municipalities: first of all to overcome the coke town situation, the unhealthy living conditions, the overcrowded old towns. Those were tasks for urban development. Enlarging the cities could no longer be the task for gardeners, as it usually had been in many European towns[2].
New concepts, like the separation of functions, new professions like the urban planner were one result of this process.[3]

[2] See the example of Turin in Italy, capital of „Herzogtum Savoyen“, typical “park-like”figures of streets and places like in other residences, Paris, Berlin...
[3] Hook, English model town, not realized, for 100 000 inhabitants with separate functions, residential, industrial and fixed green areas, grids for pedestrians and motor traffic

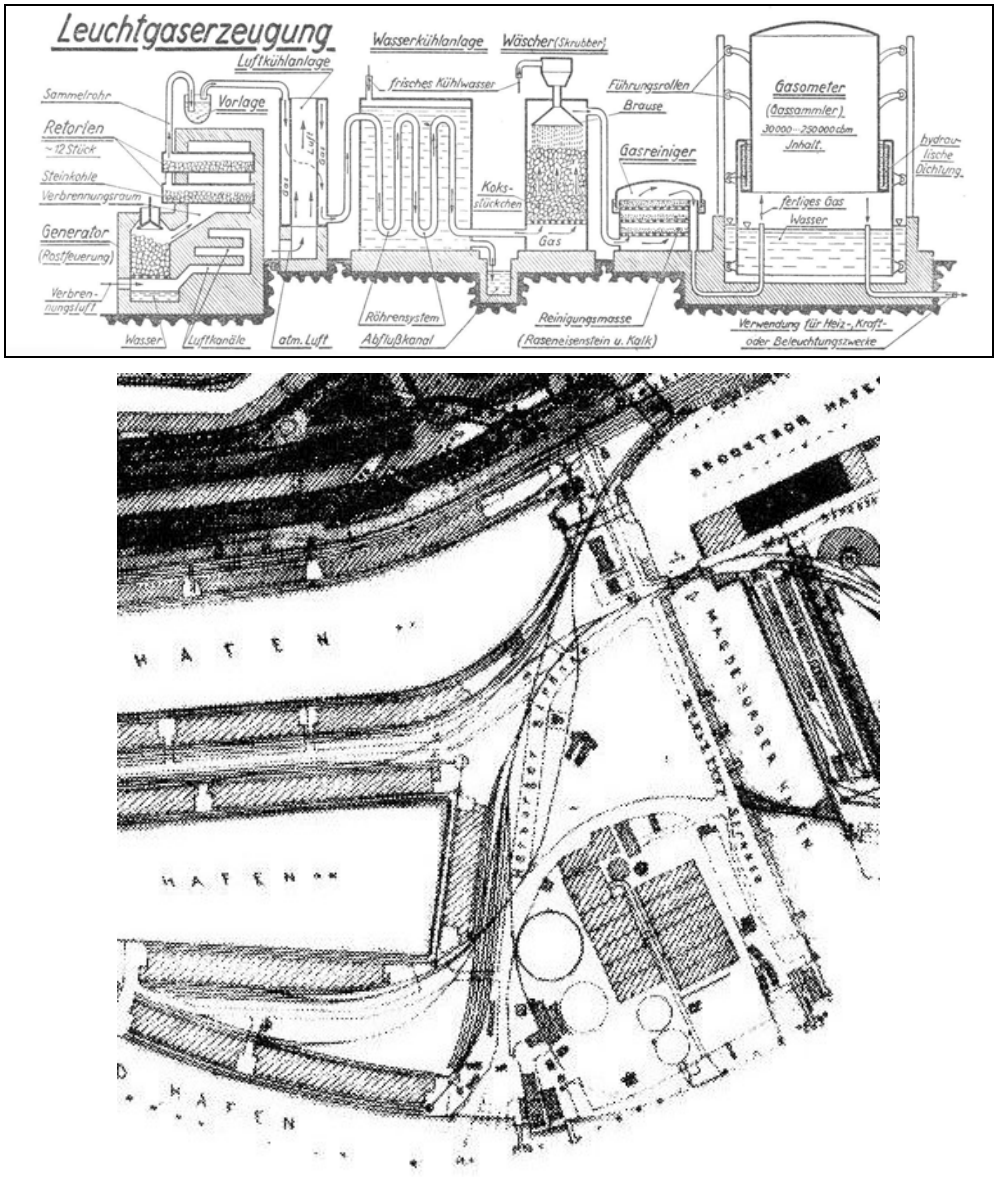


Figure 3: Increasing energy consumption e.g. by completely new invention of artificial light made of coal: graph of the production and map with first gas plan in Hamburg in 1842 (source: "Tabellenbuch für Metallgewerbe", Magdeburg 1937 and map with first gas plant in Hamburg 1868).

Not only the obligation of nice views and interesting places were important, but the requirements of water-, gas- and electricity-supply. The municipalities became suppliers for all these necessary goods. The way to prospect new streets have to follow technical requirements for pipes and tubes. The innovation was on one hand to centralize the supply of well known goods, as water and waste water, but on the other hand to create completely new things like the artificial light. This meant increasing consumption of fossil energy, e.g. lightning gas was produced by coal.

2.2 Overcoming coke town: contrary concepts

The new white comfortable international city could have several faces, like the two following contrary concepts shown on Figure 4. On the left: white cubes, separate functions, oriented to the sun, space between the houses and increasing room for the inhabitants[4]. Brno was one of the important places in Central East Europe, where the white international style sets traces in some masterpieces. An exhibition in 1928 named, "nowy dume" (new housing) was the place to show master examples for single-family houses with typical ground floors.
On the right: at the same time when the private engagement of industrialists enforced the development of white international detached houses, the soviet architectural collectives created concepts of big concentrated living units, houses with more than 1000 inhabitants and all functions like shops, offices and leisure places under one roof.[5]

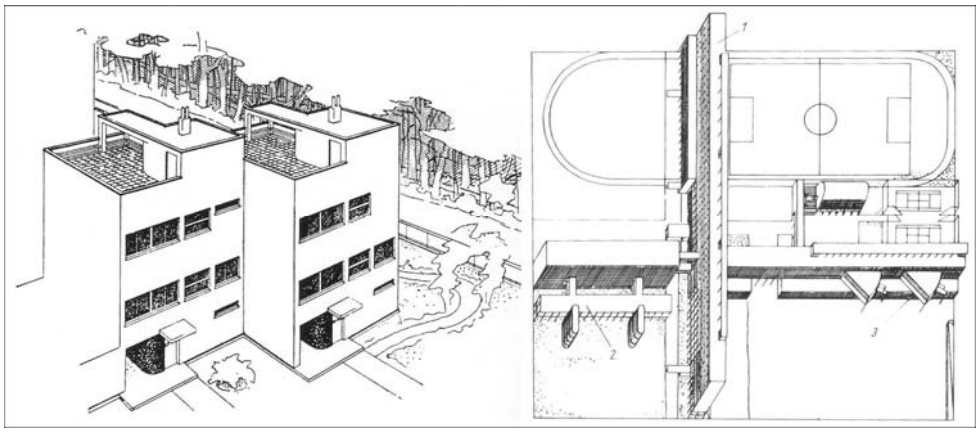


Figure 4: LEFT: white cubes as row houses, 1928 Brno Josef Štěpánek, RIGHT: white cubes, living unit for 1680 inhabitants, Bartsch, Wladimir 1929.

2.3 Overcoming coke town but not fossil town

All these efforts helped to overcome the coke town situation - but not the situation of "fossil town". Increasing average living space, increasing comfort, separation of functions, all this means also increasing the consumption of fossil energy, although the impact on environment is less visible.
Today, the average living space in Germany is 40 m² per inhabitant and furthermore 533 m² of sealed ground[6]. This figure includes sealed places like streets, airports and other traffic facilities, but also heated or air conditioned volumes like shops, schools, offices, public buildings and so on. Energy is consumed everywhere: for heating, warm water, air conditioning, electricity and transportation.

[4] Standardisation of row houses, Brno 1928 Josef Štěpánek, Architekturkolonie "Neue Wohnung"
[5] Super unit, idea of collectivism for 1680 inhabitants Wladimir Bartsch 1929, not realized
[6] Christoph Gunßer, Energiesparsiedlungen Konzepte – Techniken – Realisierte Beispiele, Augsburg 2000, S. 11

The consumption of fossil energy is regarded as problem since years, and again very different solutions have been developed.[7] There are efforts to replace fossil energy sources by renewables, through the legislation[8]. The figures of 2007 for Germany show only the small part round 7 %[9] are renewables, compared with 33% fossil fuels, 23% natural gas, 14% black coal, 12% brown coal, 11% nuclear power [10]. Concepts to save energy also involve activities to set energy standards for buildings and urban planning activities.
Two very contrary solutions had been published in 2007 and are depicted in the Pictures.

Figure 5: LEFT: Off the grid home in Layton, Utah, RIGHT: Masterwork HochschuleLiechtenstein for urban planning solutions, against urban sprawl in Switzerland.

On the left: the house is embedded in pure nature, it is hardly to be recognized as a stranger in the environment. It is not connected to any grid; it produces warm water, electricity and has its own water pump. What you can not see, is how many cars are hidden behind the building.[11]

On the right the contrary project is shown: a big concentration of inhabitants in one unit, with all functions under the same roof. This example does not focus on collectivism, but tries to concentrate inhabitants for the benefit of nature. Wild, shy animals have environment to live next to the big house. The compactness of the project helps to save energy for transportation and minimizes heat losses with its ratio of surface and heated volume[12].

Of course, between these extremes there are a lot of possibilities to realize. Examples of CO_2 free settlements, little hamlets or little towns are to visit all over Europe and examples to deal with the problems in big cities are getting started during last years.

[7] technical solutions how to overcome the fossil age are to find even on youtube: www.youtube.com key word: solar tower energy
[8] E.g.. the German law on renewable energy sources with the goal to increase the amount of renewables to 20% till 2020 or the energy related European Directives.
[9] source : Wikidedia
[10] source : www.bmwi.de/BMWi, (Bundesministerium für Wirtschaft und Technologie)
[11] Off the grid homes, see Lori Ryker, Off the Grid Homes, case studies for sustainable living Layton Utah 2007
[12] Masterwork Hochschule Liechtenstein, published in: Die ökologische Stadt, Petersberg 2007

3 Development of building regulations and urban planning instruments, or how to influence the activities of private owners

To implement measures to overcome the coke town chaos as well as the fossil town problems, means more or less the same for all capitalistic systems: how to regulate the activities of private investors?
Using the example of Hamburg, it is possible to show a very brief overview of the development of urban planning regulation.

3.1 Development of building regulation

During 700 years of the town history, the development of the medieval town or the baroque fortification efforts took place without public rules how to use a private site. It was not regulated if there had to be open spaces between the buildings. The milestone year 1842 is well known for a disastrous fire. The need for building regulations for fire protection became obvious.
The first building police regulation was set in 1863 with the objective of danger defense. Rules for staircases were fixed and the covering with buildings of the whole site was restricted. Minimum sizes for backyards were fixed.
As space was rare and expensive, no private investor wanted to waste building ground. So the houses were built up exactly around the defined minimum spaces. A type of house became common: the so called terraced houses.

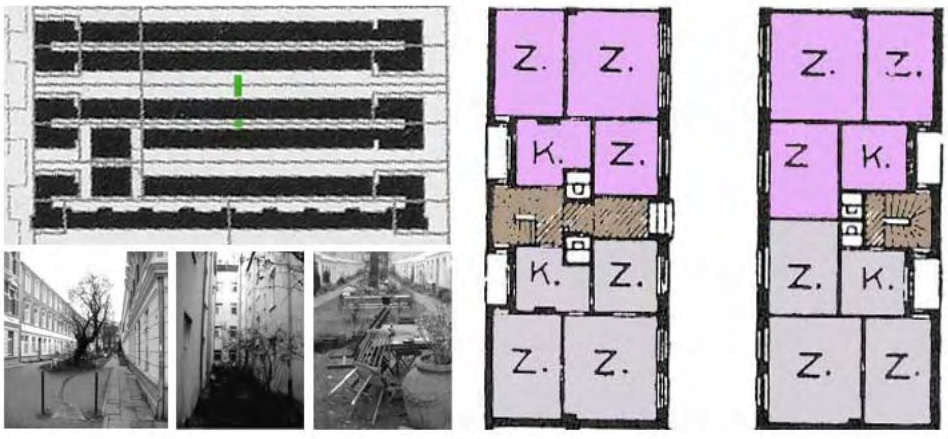


Figure 6: Example of terraced houses, minimum space for yard and backyard shown by green bar, right ground plan example of four flats oriented along the yard, using topographical maps (photos Auraplan).

Few years later, a new building police regulation was enforced. This time the minimum spaces for backyards were enlarged. In order to optimize the exploit of building ground, a new type of floor plan was created. For the next years all new residential houses followed this type of 4 – 5 story buildings with the staircases in a central place to reach two to four flats. Some windows faced only the narrow space between the volumes. This space called “Schlitz” in German, gave the nickname “Schlitzbau” to these buildings. High density and the rooms oriented to the “Schlitz” was seen as problem for

healthy living conditions, but as the regulations allowed this practice, there was no way to influence the investors to be satisfied with less exploitation.

Today, where the flats are no longer overcrowded, this type of building is very popular. “Schlitzbau” quarters are famous for the urban life style with short ways to interesting places.

Figure 7: Example of „Schlitzbau“, minimum space of backyard shown by green bar, the ground plan shows two flats with rooms oriented only to the narrow space between the volumes, the so called”Schlitz”, using topographical maps, photos, ground floor (photo: Auraplan).

The actual building regulations set by the federal states in Germany, have still some similar tasks. Since the time of reconstruction after the Second World War, they follow more or less the first national master building regulation of 1955 and their amendments.[13]
They are set for danger defense, fixing rules for fire protection, stability, the use of proved materials and also fix minimum spaces between the buildings. Today the space between the buildings is calculated as a relation of 2 times the height of the buildings. As before, changing rules change the face of the city.[14]

[13] First Master building regulation (MBO) from 1955, e.g. first Hamburg Building regulation 1969, last amendments 2006

[14] The building stock of times of reconstruction with its strict buildings is not popular today. But there is a high potential for energy saving refurbishments because of the simple cubage and strict orientation. See e.g. database www.zukunft-haus.info as example of successful refurbishment: City of Frankfurt Tevestraße 36-46 60326 Frankfurt am Main building stock of 1951 with a reduction of energy consumption from 240 kWh/m² per year to 28 kWh/m² per year

Figure 8: Minimum space between the houses as set by actual legal requirements in Germany, (Landesbauordnung-building regulations of the federal states), and shown by the green bar, is a relation of 2 times heights of the buildings. Using topographical maps (photos, ground floor, Auraplan).

One of the most important changes of the Hamburg –city character was not forced by a legislative regulation but by economic incentives: after the First World War, as hundreds of flats were missing, new buildings where erected in a red brick style. They had to follow a simple list of conditions: staircases had to be fixed to the facade and not more than two flats per storey were allowed. These rules to overcome the problems of the dark rooms and density of the 19th century town were nothing more than requirements to get loans and foundations for construction. How successful they where is obvious for all trespassers of the town.

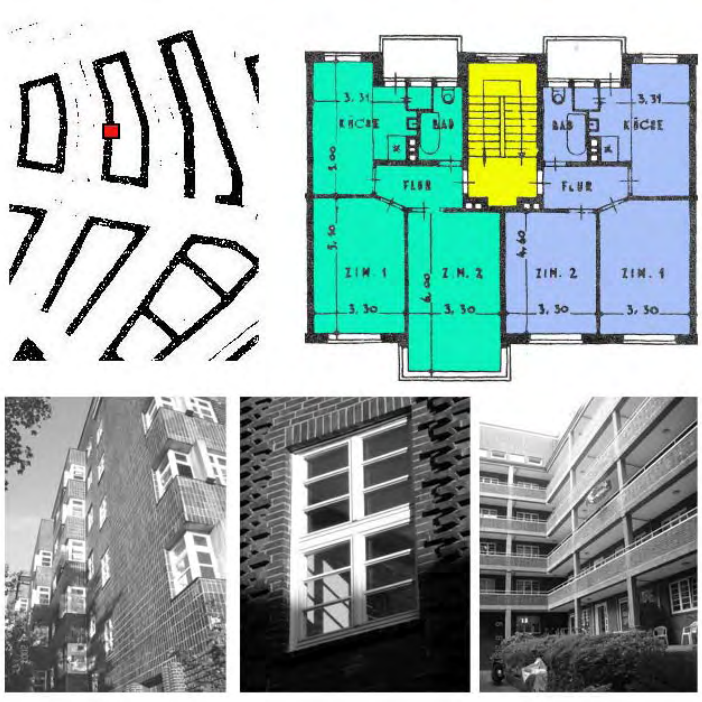


Figure 9: Example of architecture of the 20th century, LEFT above: small volumes, big back yard, RIGHT above: ground plan with the staircase oriented to the facade, and all flats oriented to the yard and street. Using topographical maps, (photos: ground floor, Auraplan).

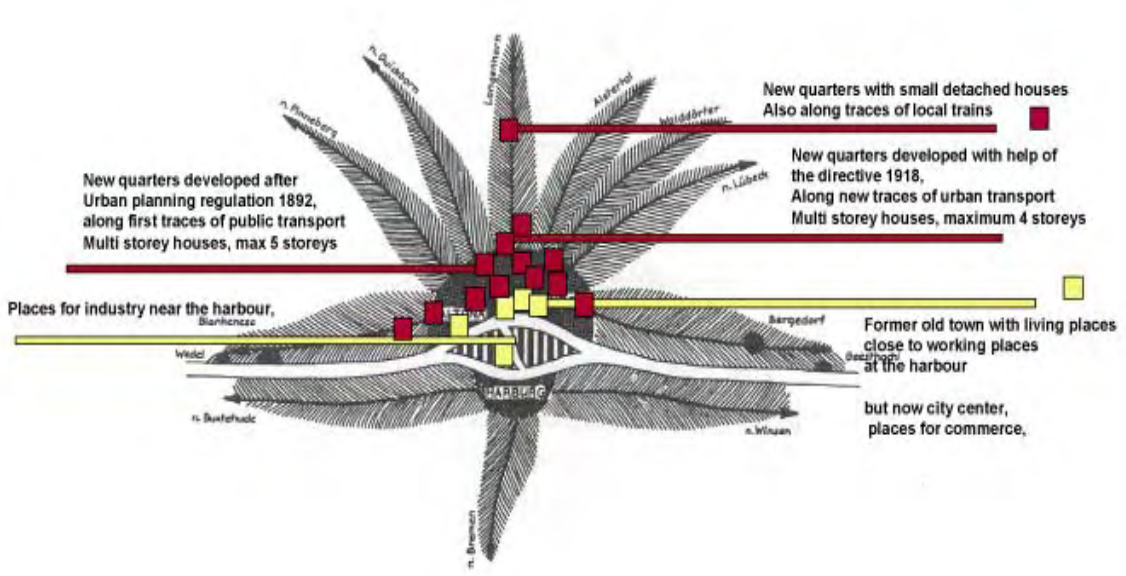


Figure 10: Ideas for development of a whole municipality: Black: Schumacher's "Fingerplan" using "Schema der natürlichen Entwicklung des Organismus Hamburg" 1919. Red and yellow: places of building activities up to early 20th (graph: Auraplan - development along traces of local trains. Red and yellow: places of building activities up to early 20th century).

3.2 Regulations for urban development

The police regulation and its followers, the building regulations with all their amendments focused on the construction activity on the site and the relations to their surroundings. Since the mid of the 19th century, first regulations for the urban development were set in general. They differentiate zones for living and working places and develop ideas how to enlarge the building stock and to access new industrial plots. Fritz Schumacher was one of the first German architects who saw himself as urban planner with a responsibility for a sane city development. He was the author of the idea to enlarge Hamburg along traces of local trains with green areas between the branches[15].

[15] Fritz Schumacher 1869-1947, Head of building department in Hamburg 1909 -33, published the "Fingerplan" 1919

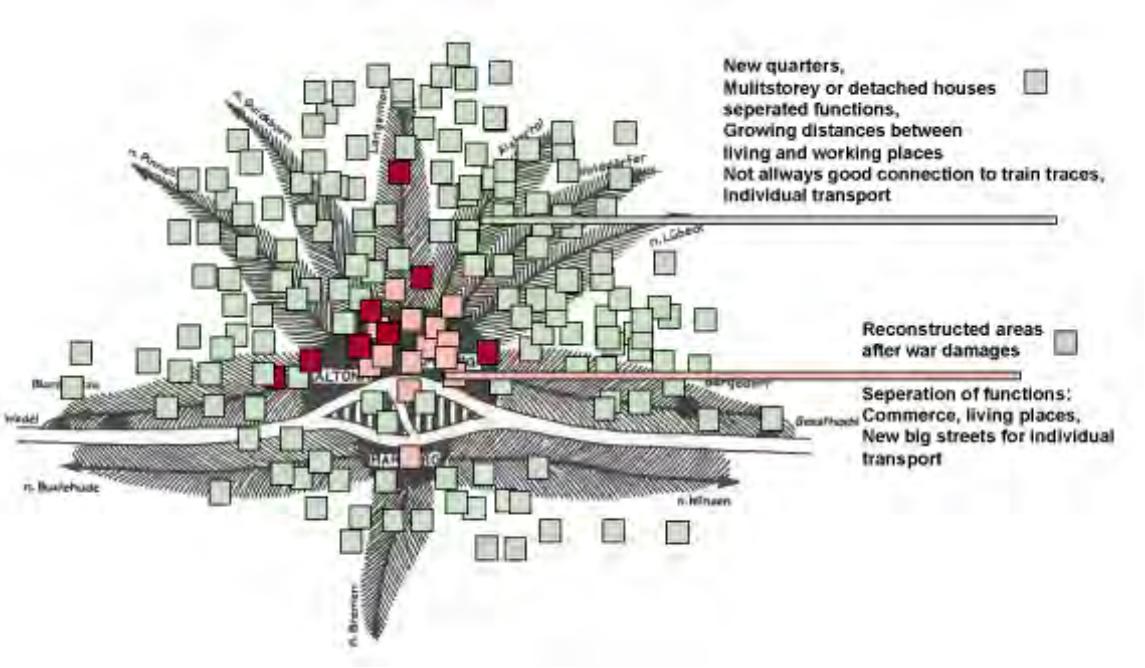


Figure 11: Idea and reality of development: Schumacher's "Fingerplan" Development along traces of local trains, red, pink and blue: places of building activities up to the 1980ties (graph: Auraplan).

After the Second World War, in times of reconstruction, this main idea of Schumacher's so called "Fingerplan" could no longer be realized. It was the time of prosperity and the victory of the private transport. The exploding building stock, the increase of living space and the possibility to reach places without public transportation led to construction activities that covered all the planned green areas.
The expanded town had its cluster of detached houses with bad energy standards (average consumption of 300 – 400 kWh/m² per year), and in the booming times the building stock was fitted with electrical heating.
Not one of the regulations[16] in the time of reconstruction had the obligation to save space, sealed ground or energy by questioning „How many meters of drainage infrastructure can we afford to excavate and exchange periodically? How much petrol can we afford on private transportation needs?"[17] These questions became current in Hamburg. But on the other hand, if the municipality had tried to forbid the covering of nature with detached houses, it would have lost citizens, who would have tried to find better conditions for their lifestyle outside of the city.

[16] First national building code 1960, several amendements, last in 2006
[17] Xavier Calderon, What on earth are we doing? A manifesto in : The Ecological City, Designs of students on the Hochschule Liechtenstein Mastercourse "Design Theory", Petersberg 2007 S. 27

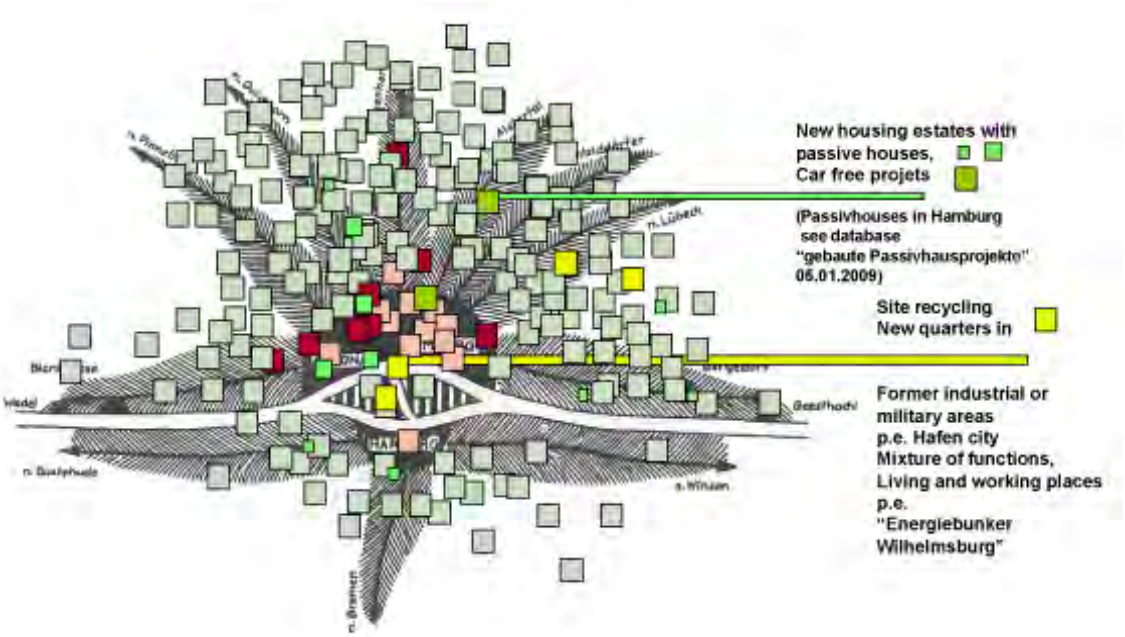


Figure 12: Changes for a green city? Black: Schumachers "Fingerplan" Development along traces of local trains, red, pink and blue, yellow and green: places of building activities up to today.

What had been the changes till April 2009, when Hamburg was selected as "European Green Capital"? [18]
Projects to reuse and recycle land were started, for example the biggest construction site in Europe, the HafenCity. Passive houses were built, detached and multi storey ones.
The International Building Exhibition 2013 in the Wilhelmsburg Quarter sets new ambitious aims for sustainability, energy efficiency and social balance. One lighthouse project is the reuse of an old shelter made of concrete as district power plant with solar panels on the top and a CHP inside.

There were municipal steering activities, like the enforcing of the HafenCity project or the new development of the Wilhelmsburg quarter.
There were private initiatives, like the passive house projects and again there was financing to strengthen theses activities e.g. by grants to get a standard of low energy consumption.

Summarizing the whole history of urban development regulations, we can be sure: they have not the objective to save energy. But never the less, they can be used to do something[19]!

[18] The European Green Capital Award has been conceived as initiative to promote efforts for improving the environment. In 2009 the first award ceremony took place, announcing the first Green Capitals: 2010 Stockholm and 2011 Hamburg. See http://ec.europa.eu/environment/euroeangreencapital
[19] The keyword energy savings is not mentioned in Master building regulation (MBO),

The following examples of energy efficient estate planning will tell about some practical measures, some ambitious aims, the "making of" and the use of urban planning instruments.

In the "Baugesetzbuch" (BauGB, or National building code) sustainability is mentioned in general and the consideration for renewable energy and energy efficiency, see articles 1, 5, and 6 f

4 Examples of energy efficient housing estate planning in German municipalities

4.1 City of Münster - Standard practice of energy saving urban planning

"Energiegerechte Bauleitplanung in Münster" is standard practice of energy efficient urban development. That means to optimise the use of solar energy, active and passive, the fixation of energy standards, better than national requirements and environmental friendly supply of warm water and heating in all stages of planning. Since 1995 intensive considerations in the city council about energy efficient urban planning took place, expertise was applied in 1998, and decision to practice "energy efficient urban planning" took place in 2000.

Figure 13: Example of a standard checked detailed urban plan: Building lines fix orientation mostly to the south, but not strict. Compactness is a must, but not to strict, and some detached houses are allowed.

The tradition of a policy of active land-buying and selling and the long history to install the energy saving standard practice helped to develop a broad panel of planning instruments.
After this long history the question how to influence the behaviour of private owners seems easy to answer. There is a request for houses and business places; the policy of energy saving urban planning is a success.

For better understanding here are some general explanations about the measures, used in Münster:

Some aspects of energy saving urban planning should been proofed during the planning process for generating energy savings with low efforts, only by optimising the form and orientation of buildings. The potentials of measures can be estimated as follows:

1. compactness
   difference of energy consumption between multi storey house and 5 row houses, both with similar energy standard: 20%

2. orientation:
Difference of energy gains between 5 houses with bad orientation compared with optimized orientation: 15%

3. passive solar gains, no shadows
Difference between solar gains of a row of 5 houses without any shadow at the facade and the same row with shadow at the facade: 10 %

4. optimized roofs for active solar use:
Difference between solar gains of optimized orientation of a roof and a bad oriented roof for the use of solar panels for hot water supply: 10 – 15%.20

Figure 13 a: Calculation example: FIRST ROW: houses with minimum distance - see legal requirement, of German Building regulation (Landesbauordnung - LBO) of 2 x h houses 10 m, distance 20 m, SECOND ROW: houses with the distance recommended for Münster houses 10m, distance 27,5 m, no shadow in the first floor flats in winter (Graph: Auraplan).

To optimize passive solar gains the space between buildings had to be fixed to avoid shadows of one building at the facade of the next. The recommendation for good results even in January for Münster is a space between buildings of 2,75 x h.

In comparison with the space (2 x h) fixed by the Building regulation LBO, this leads to more space between buildings. It has to be discussed on project by project basis if these effect is meaningful. That is the reason not to estimate it only for the extreme situation in January, but also in spring time. Consequently, the optimisation is complicated and it is helpful to use special software to simulate cubes and shadows. After creating the models of houses, it is possible to follow the shadow from morning to evening and from summer to winter and to calculate solar gains and losses. It is a matter of further discussion, when a building is fitted with triple glaces, where energy losses are minimised, but solar gaines reduced *(source: www.solarserver.de*, see examples of links to several software producers)[20]

[20] for further information see: *www.solarserver.de*

The biggest savings are counted by the optimisation of the energy supply of new built quarters.
A checklist[21] for recommendation helps to prove the most economic solution, the mandatory connection to district heating or the decentralized power plants.
When questioning the economy of decentralized power plants: e.g. a calculated energy demand of 400 MWh/a can be a hint for an economic investment or the planning of net living space of 3000 m² or more.

Next question is how to reach the goal of mandatory connection to energy suppliers. Fixations can be set by B – Plans, or urban planning contracts.

SHORT DESCRIPTION OF THE MUNICIPALITY:

TOTAL SPACE:	302,92 km²
INHABITANTS:	272.890 *(30. June 2008)*
DENSITY:	901 inhabitants / km²
ALTITUDE:	60 above sea level

MAIN ASPECTS OF ENERGY SAVING URBAN PLANNING:

In all stages of the planning process the following aspects should be optimised:

- Compactness of buildings
- Orientation, big openings to the sun
- Passive Solar gains, no shadows
- Active solar use: orientation of roofs, Preparation for solar panels.
- Energy standard better than legal requirement,
- Energy supply, Consideration about decentralized CHP

INITIATORS: City of Münster

KEY ACTORS: City of Münster
Department for Environment / City Planning (Umweltamt /Stadsplanungsamt)

Dr Dagmar Everding, Solarer Städtebau Ziele und Aufgaben
or www.gosol.de as experienced software producer

[21] at the same place

URBAN PLANNING INSTRUMENTS

INSTRUMENTS		DESCRIPTION
1.	**DEVELOPMENT PLAN (SEE § 8 BAUGB)**	Use of all possibilities to influence compactness and orientation and the space between buildings like building lines, fixation of roofs orientation to prepare active solar appliances and fixations of places for energy supply.
2.	**URBAN PLANNING CONTRACTS (SEE § 11 BAUGB)**	Contracts to enforce connections and use to special energy suppliers.
3.	**LAND SALE CONTRACTS**	As the Urban development contracts they set the special Münster standards: Energy standard better than legal requirement, or mandatory use of district heating for the buildings. This needs the precondition, that the municipality itself is the land owner.
4.	**DISTRICT HEATING BYLAW**	This bylaw fixes the legal possibility to enforce the connection to the CHPs. Municipalities are allowed to set bylaws like this by the local government law of the federal state North Rhine Westphalia
5.	**CHECKLIST AND GUIDELINES FOR DEVELOPERS**	Infomaterials.

4.2 Hannover Kronsberg - Energy saving urban planning in an entirely new quarter

The EXPO 2000 was the occasion for the planning of the entirely new district of 1200 ha on mainly agricultural land. For EXPO 2000, 1000 flats were needed rapidly for exhibition workers, and Hannover City administration and environmental departments gave the idea of energy efficient buildings. The aim was to create a new city district, where the idea of sustainability was applied from all stages of the planning process. Urban planning competition was conducted already between 90-94 and EXPO Society granted 4 mil EUR for building the houses. Contract (Städtebauliche Vertrag) was made between the city and investors. The settlement was designed by several architects and 3.000 flats for 6500 inhabitants accompanied by relevant infrastructure were completed by 30 investors already by EXPO exhibition. New planning concept was introduced, such as cooperative planning, roundtables for stakeholders (social, urban, green area, environmental planners), etc. Investors had to comply with higher energy efficiency standards that are 25-30% below today's standards, still every investor achieved it[22]. Compared to a conventional quarter, build in the same time, the Kronsberg district aims to 60% CO_2 reduction via mandatory low energy standard with quality assurance, mandatory use of CHP district heating and 20% CO_2 reduction by electricity supply by windmills.

Now the Kronsberg district is a lively quarter, with social balance and a normal life. People feel at home in a lively urban quarter: work – and living places, shops, recreation space and good public transport in a good social balance. It seems that the inhabitants have forgotten that they took part in a big experiment of urban planning. The learning of this experiment is now standard practice for planning processes in the whole town.

Figure 14: Entirely new quarter along the new tram line, yellow signs show tram stops. Commercial areas with working places are near the residential area, and are shown as big red forms west of tramline. Space saving building forms, there are no detached houses.

[22] see: Handbuch / Handbook Hannover Kronsberg, Planning and Realisation, LHH 2004
Vorwärts nach weiter, Hannover Kronsberg: from model settelment to standard practice, LHH 2007

Target:
Entirely new district of 1200 ha on mainly agricultural land with 6500 inhabitants in 3000 flats and infrastructure in an environmentally friendly way.

TIMETABLE
First competition: 1992
Zoning plan: 1994
Development plans: 1995
Implementation: since 1997

SHORT DESCRIPTION OF THE MUNICIPALITY:

TOTAL SPACE: 204,14 km²
INHABITANTS: 518.088 *(30. June 2008)*
DENSITY: 2.538 inhabitants / km^2
ALTITUDE: 55 above sea level

MAIN ASPECTS OF ENERGY SAVING URBAN PLANNING:

The Kronsberg project shows a broad variance of aspects, from general concepts for energy supply to ideas about a sustainable rain water management. A short overview follows:

- energy efficiency optimisation
- energy standard of houses above legal requirements
- mandatory district heating from decentralized CHPs
- windmills
- space saving construction in a newly bilt up disrict
- cooperative planning procedure
- complex users structure: residential, commercial, recreation, agriculture, transport, public transport.
- soil management

INITIATORS: Hannover City Administration and Environmental Departments

KEY ACTORS: for setting standards: Municipality of Hannover, Environmental Department,
for implementation: private developers, private owners.

URBAN PLANNING INSTRUMENTS

INSTRUMENTS		DESCRIPTION
1.	**PROCESS-BASED ENVIRONMENTAL IMPACT ANALYSIS FOR EXPO 2000**	The findings from the EIA served as a base for decisions to be taken in the city council and as information for participants in the following competitions.
2.	**URBAN AND LANDSCAPE PLANNING COMPETITION**	Following the motto “Humankind-Nature-Technology” the aim was environmental friendly overall concept for Kronsberg.
3.	**DEVELOPMENT PLANNING, ZONING PLAN (SEE § 5 BAUGB)**	Objective was to minimise the amount of land covered by building and paving. Creation of urban quality with a balanced social structure, good public transport infrastructure. A special task was the fixation of the location for the windmills.
4.	**DETAILED URBAN DEVELOPMENT PLAN (SEE § 8 BAUGB)**	The fixing of boundaries and density were used to get compactness and to avoid clusters of detached houses.
5.	**URBAN DEVELOPMENT CONTRACTS (SEE § 11 BAUGB)**	These contracts between municipality and investor set the special Kronsberg standards: Energy standard better than legal requirement, Mandatory quality check of construction Mandatory use of district heating for all, instead of passive houses, Kronsberg buildings CHP.
6.	**LAND SALE CONTRACTS**	Similar to Urban development contracts they set the special Kronsberg standards: Energy standard better than legal requirement,
7.	**MANDATORY QUALITY CHECK OF CONSTRUCTION**	Mandatory use of district heating for all Kronsberg buildings, see point 5 above This needs the precondition, that the municipality itself is the land owner.
8.	**FINANCING**	Incentive for investing at Kronsberg although the construction costs seemed to be higher then in other districts because of the mandatory quality check and the better energy standard.
9.	**DISTRICT HEATING BYLAW**	This bylaw fixes the legal possibility to enforce the connection to the CHPs. Municipalities are allowed to set bylaws like this by the local government law of Lower Saxonia.

4.3 Freiburg Vauban Quarter: New life in old buildings, site recycling as idea of energy saving urban planning

Development of the lively new residential quarter Vauban with approximately 2000 inhabitants was realized without sealing agricultural land[23]. It was a measure to reuse cca 38 ha former military zone, with building stock of the 1930. These existing buildings were partly retrofitted and arranged for residential needs. The combination of the old structure with new architectonical elements created an interesting structure.
The reuse of military sites was observed with interest by Freiburg inhabitants. The city administration was successful with a smart use of planning- and participation instruments.

Now the Vauban is a sustainable quarter of short ways, with a good social balance. Inhabitants with low incomes and well situated people live together in mixed neighborhoods: students in the former military buildings, passive houses owners, people joining the car free projects[24], joint planning or cooperation projects.

The Vauban quarter shows not the most innovative energy standard or energy supply but a broad panel of holistic thinking and planning, from social balance to transport and from passive house to reuse of existing building stock.

Figure 15: The former structure of the Vauban quarter is recognized by the alley in East-West direction and the rest of existing building stock along the alley with the tramline. (Source: www.diercke.de).

TIMETABLE

Competition:	1994
Urban development plans:	1997
Implementation:	1997 - 1999

[23] Material: www.vauban.de, Christoph Gunßer at the same place, S.74 ff
[24] Joining a car free project means to sign a contract, that the household has no car. Therefore the houshold has no obligation to finance a parking place.

SHORT DESCRIPTION OF THE MUNICIPALITY:

TOTAL SPACE: 153,1 km²
INHABITANTS: 219.430 *(31st Dec 2007)*[1]
DENSITY: 1434 inhabitants / km²
ALTITUDE: 278 m above sea level

MAIN ASPECTS OF ENERGY SAVING URBAN PLANNING:

- Development of the former military area
- Site recycling,
- Participation of inhabitants in planning processes
- Energy saving by recycling of existing building stock (savings of 25% compared with demolition and rebuilding of similar volume[1])
- Connection to public transport
- Reduction of private car use, district garage
- One part organised as car free project
- CHP with biomass, (wood pellet)
- Mandatory low energy standard
- Mandatory district heating from decentralized CHPs

INITIATORS: Groups of interested citizens.

KEY ACTORS: City of Freiburg,
Württemberg“ Development Agency of the Federal State Baden (Entwicklungsträger: Landesentwicklungsgesellschaft Baden Württemberg), Stuttgart Groups of private developers, projects of joint planning.

URBAN PLANNING INSTRUMENTS

INSTRUMENTS		DESCRIPTION
1.	**URBAN PLANNING DEVELOPMENT MEASURE (§ 165 BAUGB)**	The municipality becomes the owner of the former military area. All “speculation” is stopped for the time of implementation. That means selling and reselling stops, the prices are frozen for the time, of the development. The sites are sold afterwards part by part to private owners. The difference between the lower price before the measure and the higher one afterwards was used to pay for all technical infrastructure.
2.	**DEVELOPMENT PLAN**	Mandatory energy standard for all buildings better than national requirement. (Municipality as land seller) No strict rules how to orientate the buildings. Only fixation of building boundaries, but some freedom to set the buildings within this frames by the private initiators, projects, cooperatives etc.
3.	**FORUM VAUBAN**	As actor for integrated planning and participation.
4.	**DISTRICT HEATING BYLAW**	This bylaw states the legal possibility to enforce the connection to the CHPs. Municipalities are allowed to set bylaws like this by the local government law of Baden Württemberg.

4.4 Salzhemmendorf: Great success in small municipality

The small municipality of Salzhemmendorf is one of villages that joined the 100% movement, to get rid of fossil energy[25]. Within two years Salzhemmendorf managed to produce more electricity made of renewables as the inhabitants demanded. The calculated demand of all inhabitants is 15 mil kWh/year[26]. The windmills and biogas power plants produces ca 36 mil kWh/year. That means there is a rest of cca 21 mil kWh/year for industry and external use. For this engagement the municipality won the German Solar Award 2008[27]

This success was enforced by private initiative: Political groups had been informed about climate change. Farmers liked the idea to invest in biogas technology. The thermae "Soletherme" in Salzhemmendorf was interested to use the warm water made by renewables to save money and to keep the ticket prices. These components made the packet economically interesting: the contracts between producer and consumers.

The regional supplier, Stadtwerke Hameln got into the investment for the biogas power plants.

The municipality supported this engagement and assisted in informing about this successful model. Also, they were encouraged enough to set no fixations for the heights of the windmills, to support the best technical solution.

Currently more activities involving municipality directly, like fixations for solar panels for new buildings are in the pipeline.

This example shows that the target to be 100% free of fossil energy is easy to reach for small municipalities. In this case it was easy to find biomass and locations for windmills and to bring the actors together. In Salzhemmendorf they managed it in 2 years.
Indeed Salzhemmendorf is only one example of a small successful 100% municipality. Güssing, Morbach, Ostritz are another examples. Furthermore, the whole region Hamelns Pyrmont wants to reach the goal as well.

TIMETABLE

<u>100% free into two years:</u>

Starting activities, information etc.:	2004
Opening of the wind park:	2006
Start of the biogas power plants:	2006
Eurosolar award winner:	2008

[25] for further information, see:www.100re.net, or the example of the smallest region, Mureck, Steiermark, Austria, of the 100% movement : www.seeg.at

[26] source: application for German Eurosolar Award

[27] This award can be applied by private persons, architects, engineers or organisations engaged for renewables. Since 2008 it is possible for municipalities to apply, if they go for 100% movement. For further informations see: www.eurosolar.org

SHORT DESCRIPTION OF THE MUNICIPALITY:

TOTAL SPACE: 94,4 km²
INHABITANTS: 10.286 *(31st Dec 2007)*
DENSITY: 109 inhabitants / km²
ALTITUDE: 86 - 441 above sea level

MAIN ASPECTS OF ENERGY SAVING URBAN PLANNING:

- investment of the regional energy supplier, Stadtwerke Hameln
- energy efficiency in commerce
- the idea of regional management
- participation of inhabitants and businesses

- Model for efficient use of biogas technology: for electricity and warm water, well prepared project with contracts between the producer and consumer, the Thermal bath, some industry and a school.
- 4 biogas power plants producing 16 mil kWh/year, energy carrier: corn silage, dried dung
- model for efficient use of windmills with heights of 108 m:
  5 windmills producing 20 mil kWh/year

INITIATORS: Private initiators, farmer interested in biogas technology, groups interested in environmental policy (BUND)

KEY ACTORS: municipality of Salzhemmendorf
regional energy supplier
private investors: farmers with the biomass plant and local entrepreneurs.

URBAN PLANNING INSTRUMENTS

INSTRUMENTS		DESCRIPTION
1.	**DEVELOPMENT PLANNING, ZONING PLAN (SEE § 5 BAUGB)**	Location for windmill.
2.	**SUPPORT OF PRIVATE INITIATIVE**	By political decision.
3.	**ENGAGEMENT IN PUBLICITY FOR THE 100% MOVEMENT**	Application for German Eurosolar award

5 Summary of all urban planning instruments

MAINLY USED PLANNING INSTRUMENT	LEGISLATION, TYPE OF PLAN IN RESPONSIBILITY OF MUNICIPALITIES	PRECONDITION
Fixations of locations for energy supply, windmills	Development planning, "zoning plan" (§5 BauGB)	Instrument in standard responsibility of municipality
Minimise the amount of land covered by building and paving	Development planning, "zoning plan" (§5 BauGB)	Instrument in standard responsibility of municipality
Fixations to influence compactness and density	Detailed urban development plan (§8 BauGB)	Instrument in standard responsibility of municipality
Fixations to influence orientation of houses and roofs for passive solar gains and preparation of active solar use	Detailed urban development plan (§8 BauGB)	Instrument in standard responsibility of municipality
Urban planning contracts, e.g. to enforce the connection to special energy suppliers	Urban planning contract, (11 § Bau GB)	Instrument in standard responsibility of municipality, cooperation with private investors
Possibility to stop speculation in real estate for the time of implementation. Municipality becomes land owner for the time of implementation	Urban development measure (§ 165 BauGB)	Instrument in standard responsibility of municipality
District heating bylaw To enforce the connection to CHP	Local government law of federal state	
Land sale contract Energy standard better than national requirements, mandatory quality check.		Municipality is land seller
Financing Incentive for investments in high energy standard	Soft measure	
Information material for private investors to convince them to do more for energy efficiency	Soft measure	
Support for private initiative	Soft measure	

Figure 15 Orientation, preparing Solar applications,

photo Auraplan

Figure 16 Optimising energy standard, here passive house site,

photo Auraplan

Figure 17 Instruments to enforce connection to CHP,

photo Auraplan

Figure 18 Financial instruments, here construction site panel with the logo of the bank offering special credits,

photo Auraplan

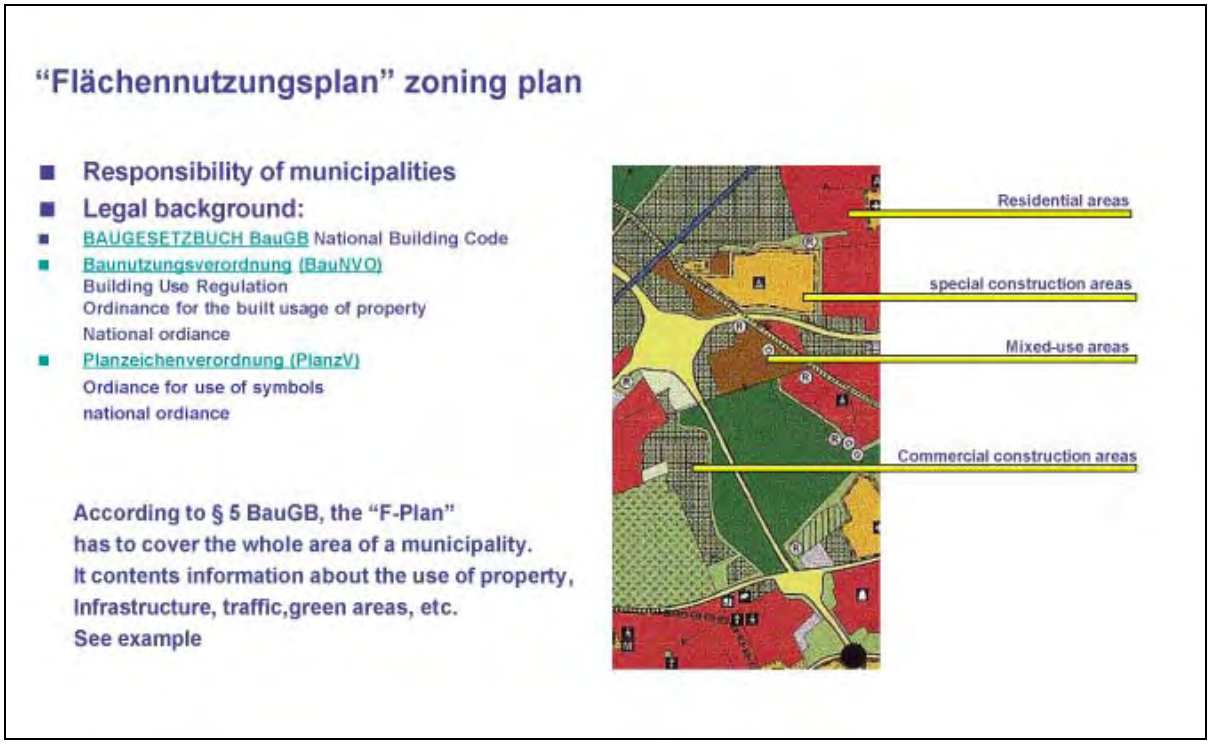


Figure 19: Example for fixations in a German "zoning plan".

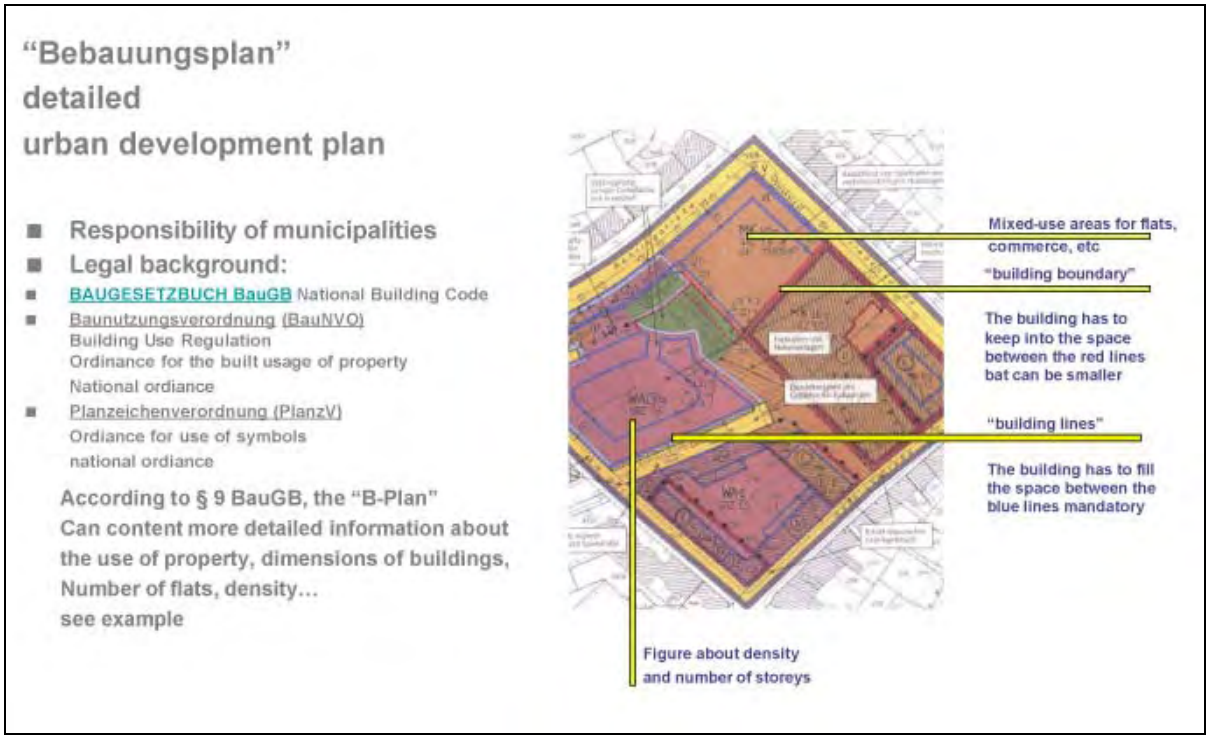


Figure 20: Example for fixations in a German detailed development plan.

6 Adaption concepts for CEE

Referring to the situation in 2009, in many CEE countries construction activities (i.e. construction of new houses) has considerably slowed down due to the current economical situation. In previous years during the so called "building boom"[28] the development of new houses sometimes went faster then proper planning. This regards especially to satellite settlements around big cities by re-classification of the agriculture land into the building land, recently causing many problems related to the urban sprawl.

Still ongoing building activities in both sectors, multi-storey or single houses are almost all enforced by private owners or investors, and the small percentage might be also construction initiatives by municipalities e.g., social houses or just residential houses.

But how far municipalities can or would like to go trying to influence the behaviour of private investors? What are their instruments or possibilities to influence, what are their responsibilities? Are there planning instruments of the German municipalities that can be adapted or used by municipalities in CEE countries? What are the common duties of municipalities, and what are the specifics in planning culture?

To get answers to these questions, the INTENSE project partner country representatives were asked to compile the information reflecting the development of urban planning process in their countries[29] (see annex).

In nearly all countries covered by the project scope, municipalities have the responsibility to set zoning plans in a scale of 1:5000 or more (see Table). That means fixations for the land use in different areas for the whole municipality: residential areas, commercial areas or locations for energy supply and other infrastructure needs.

Some countries have detailed plans, like the German detailed urban plan in a scale of 1:1000 and the possibility to set fixations site by site. With this instrument it can be possible to influence the compactness and orientation as preconditions for active and passive solar gains.

[28] E.g. stemmed from discussion with City mayors in Slovakia, reported by Michal Tvrdon

[29] Estonia, Latvia, Lithuania, Poland, Germany, Czech Republic, Slovakia, Slovenia, Hungary, Bulgaria, Romania and Croatia.

Table: Overview on responsibilities by national legislation, given to the municipalities in CEE countries

Country	Zoning plan - responsibility for zoning plan, land usage -	Detailed plan - responsibility for detailed urban planning -	Building permit, with energy certification
Bulgaria	Yes, Master plan, scale depending on the area 1:5.000 and more	Yes, scale 1:1.000 to 1: 5.000	Yes
Croatia	Yes, physical plan, scale, 1:25.000	Yes, scale 1:1.000 to 1: 5.000	Energy certificate after Sep 1, 2009
Czech Republic	Yes, spatial plan and land development plan for one/several municipalities	Yes, regulation plan	Yes, from Jan 1, 2009
Estonia	Yes, municipality scale – 1:20.000; in the city something 1:5.000	Yes, from 1:500 to 1: 2000	Building permit – yes, energy certificate after Jan 1, 2009.
Hungary	Yes, physical urban plan	Yes, scale 1:500 or less	Yes, partly implemented
Latvia	Yes, town urban development plan1:10.000	Yes, detailed plans for certain specific areas in towns, scale 1:500 or 1:2.000	Yes, from Jan 1, 2009
Lithuania	General plan, scale depends on the size of the town and ranges from 1 : 25.000 for large town to 1 : 2.000 and (or) 1 : 5.000 for small settlements	Yes, detailed plans, scale 1:500 to 1:1.000	Energy certificate from Jan 1, 2009
Poland	Yes 1:20.000 spatial development plan	Yes, local spatial development plan, scale 1:1.000	Yes
Romania	Yes, general urban plan, scale 1: 25.000 And zoning urban plan, scale 1:5.000	Yes, detailed urban plan, scale 1:500	Yes
Slovakia	Yes, master plan, scale: 1 : 25.000, 1 : 10.000	Yes, scale: 1 : 5.000, 1 : 2.000; consideration about solar use in several municipalities	Yes
Slovenia	Yes, municipal spatial plan (scale 1 : 10.000 or 1 : 20.000), however MoE must confirm it	Different regional state offices are issuing guidelines to municipality for setting detailed municipality spatial plans (1: 1000), energy aspects may be considered by municipalities.	Energy certificate after Sep 1, 2009

Summarising the findings it can be pointed out that municipalities in CEE can play a certain role influencing the energy optimized urban planning:

- Responsibility to develop zoning plans in principle leads to the possibility to influence the general development: e.g. where to change agricultural land into building land, or where to reuse former military land or empty commercial plots. It can be set, how new residential areas are connected to public transport.

- Like in Germany the CEE municipalities are involved in the permission practice for new buildings. They have the obligation to check if all requirements are fulfilled, including the requirements of energy standards.

- However, the municipalities have no possibilities to ask for stricter requirements and better energy standard. Mostly they are not land owners and sellers themselves. In this case they can not use the instrument of land use contracts for fixation of better energy standard. But there is still the possibility they could play a more active role as land owner or seller in the future.

7 Annex - development of building regulation in CEE and Germany

Estonia

Regulations for construtions

Regulations for urban planing

1939 Building Act

1995 Planning and Building Act:

- main conditions for land use and building activities
- Basis for territorial and socio-economical planning

2003 Building Act

Type of plan:
In Building project (for getting building permit),
scale 1:100

- Act on energy efficiency of equipment
- Regulation regarding energy audit
- Regulations regarding energy certificate
- Regulation about energy efficiency minimum requirements

Development of Building Act on national/local level — various differentiations 1990 till 2008

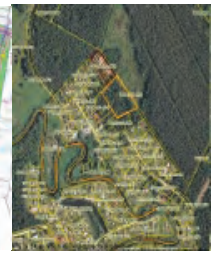
Development of Building regulations on local level — various differentiations 1990 till 2008

Municipal Building regulations (to implement Building and Planning Acts):

- General planning
- Detailed planning
- Building permits

Type of plans:

- Left: general plan
- Right: detailed plan



Municipal building regulations can in theory be a place for stating energy efficient housing esatate planning aims

Intelligent Energy Europe

Latvia

Regulations for construtionRegulations for urban planing

Until 2005 -

General plan

Since 2005 -

Urban development program

Urban development plan

Territorial plan:

- Differentiation of zones indicating permitted modes of land use
- Local binding building regulations

General plan of a town (1998) (indicates permitted modes of land use)

Territorial plan of a town (2005) (indicates permitted modes of land use) Scale 1:15000

Municipalities are not allowed to set requirements for energy performance of buildings stricter than set by national legislation

Development of Building regulation on regional/local level — **various differentiations 1990 till 2008**

Development of Building regulation on national level — **various differentiations 1990 till 2008**

Construction Law (1995):

- competencies, permitting procedures

General Construction regulations (1997):

- requirements for development of construction design, performance of construction work

Building Code LBN 002-01 (2001; 2004) - Thermal requirements of the building envelopes:

- minimum requirements for energy performance of buildings

Law on Territorial planning (2002):

- levels of territorial planning,
- competencies of public institutions

Law on Energy performance of buildings (2008):

- energy certification of buildings

Type of plans (for building permission Scale 1:100)

Law on Energy performance of buildings, Building Code LBN 002-01 can be used as steering instruments for municipalities for energy efficient housing estate planning

Intelligent Energy Europe

Lithuania

Regulations for construtions

1996

Republic of Lithuania Law on construction

Main topics:

- Essential requirements for all construction works (mechanical resistance and stability, fire safety, health and environment, etc.)
- Technical regulation
- Permitting issues
- Minimum energy performance requirements (amendment)

Type of plans
(for building permission
Scale 1:100)

- Technical regulations of construction
- Energy performance of buildings
- Energy certification
- Inspection of boilers and air-conditioning systems
- Other regulations
- Methodology of comprehensive audit on the use of energy in public buildings
- Rules for efficiency of energy and energy resources
- Methodology for promotion of alternative energy resources use in housing sector (draft)

Regulations for construction: Development of Building regulations on regional level — Various amendments from 1990 till 2008

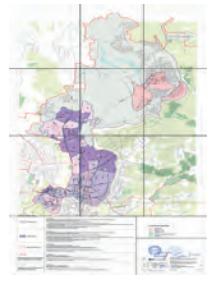
Regulations for urban planning: Development of Building regulations on national level — Various amendments from 1990 till 2008

Regulations for urban planing

Republic of Lithuania Law on territorial planning

Main topics:

- General planning (master plans)
- Special planning (schemes for the lay-out of skyscrapers, heat supply plans)
- Detailed planning (for construction of residential buildings, development of land plots)



Type of plans
Left: Master plan of Elektrenai municipality
Right: Special plan of the heat supply for Vilnius city

- Special regulations for the preparation of general plans
- Law on heat supply
- Energy efficient housing aspect should be involved in detailed planning procedure

Intelligent Energy Europe

Poland

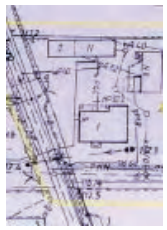
Regulations for constrution

Regulations for urban planing

Regime change 1990

Construction Law – amended 19 IX 2007 to implement Directive 2002/91/EC

Type of plans
(for building permission
Geodesic map,scale
1:1000, 1:500)



- Law on support for thermo-modernisation and renovations
- Energy Law
- Assumptions to the Law of Energy Efficiency
- Decree on technical requirements for buildings and location thereof
- Decree on specific form and scopa of a construction project

Regulations for construction: Development of Building regulations on national level — various differentiations 1990 til 2008

Regulations for urban planning: Development of Planning regulations on national level — various differentiations 1990 til 2008

Planning and spatial development Law, 27 III 2003

Types of plans
Left: local spatial development plan (1:1000)
Right: municipal plan of pre-conditions and directions for spatial development (1:20000)

All national building code (and other relevant law) applies on regional scale as well, as in Poland there is no separate regional legislation.

Intelligent Energy Europe

intense energy efficiency

Germany

Regulations for construtions

Union 1990

“LBO-Landesbauordnung“ –
Building regulation of federal states
Main toppics:
stability, fire protection,
use of proofed materials
Minimum space between buildings

Regulations for building permission

Type of plans
(for building permission
Scale 1:100)

Regulations relevant for Energy standard and energy saving?
No building permission without energy certificate
EnEV 2007
Energy saving ordinance
(Implemention of directive 2006/32/EC)
EEWärmeG
Regulation of use of renewables for heating and warm water supply

Regulations for construction: Development of Building regulations on regional level? — various differenciations 1990 til 2008

Regulations for urban planning: Development of Building regulations on national level? — various differenciations 1990 til 2008

Regulations for urban planing

BauGB Baugesetzbuch
***National building code*:**
Main toppics:
Zoning planning,
Urban planning,
Urban development
Responability to make general - and development plan by municipalities

Type of plans
Left: (Flächennutzungsplan) zoning plan?
Right: (Bebauungsplan) urban develpmentplan

Which regulation can be Relevant forenergyefficient housing estate planning?

Parts of the national Building code can be used as steering instruments for municipalities

Intelligent Energy Europe

Czech Republic

Regulations for construtionRegulations for urban planing

laws:

2000 406/2006Sb. on energy management

177/2006Sb. novelization of 406/2000Sb.

2006 183/2006Sb. on town and country planning and building limitation

184/2006Sb. on ownership withdrawal or limitation

185/2006Sb. parlamentary comments law 184/2006Sb.

186/2006Sb. about changes in related laws to 184/2006Sb.

Crucial regulation of energy aspects in housing estate planning

Housing estate planning in general

Determining special cases, about ownership withdrawal

406/2006Sb.
he regions and municipalities provide a regional/localenergy conception on possible energy sources and their management in the area

Development of Building regulation on regional/local level — various differentiations 1990 till 2008

Development of Building regulation on national level — various differentiations 1990 till 2008

regulations:

498/2006 Sb., on authorized inspectors autorizovaných inspektorech.
499/2006 Sb., on buildings documentation
500/2006 Sb., on land analytical basis, documentation of town and country planning and evidence
501/2006 Sb., on general demands and land use
502/2006 Sb., changing 137/1998 Sb., on general technical demands on construction
503/2006 Sb., on detail areal management, statutory contracts and territorrial measures_526/2006 Sb., on processing the certain enactments of building limitation

406/2006Sb.
the national energy conception (approved by government) with a 20years perspective determines basis for regional/ocal energy conceptions

2007 68/2007Sb. novelization of 183/2006Sb.

2008 191/2008Sb. novelization of 183/2006Sb. In the meaning of 68/2007Sb.

Intelligent Energy Europe

Slovakia

Regulations for construtions

Regulations for urban planing

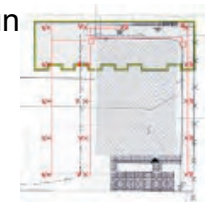
- national building code which is still in operation came into the force in 1976, but recently there is a new act (building code) in preparation

1990

Regional / local regulation

basic components – the basis is mentioned Act 50/1976, then on the local level every municipality is preparing the final regulation (part of the city master plan) and generall bindings rules as the executive rules on the local level.

GBR – the final regulations in planning documents are transformed to GBR and these can differ from municipality to mun



Generall bindig rules e.g. (suorce: Bratislava city master plan)

- Considering terrase houses construction – better for solar usage
- Solar energy usage
- Consideration of the orientanion of new buildings

Development of Building regulation on regional/local level — **various differentiations 1990 till 2008**

Development of Building regulation on national level — **various differentiations 1990 till 2008**

"Zákon c. 50/1976 o územnom plánovaní a stavebnom poriadku" Act. No. 50/1976 on spatial planning and on construction order (well known as the Building code):

basic components – the act is twofolded in:

1) Spatial planning

1) Contruction Order

- Energy efficiency (para 43d)?
- Energy efficiency and consideration of climatic conditins
- General technical requirements for energy efficiency (47)?

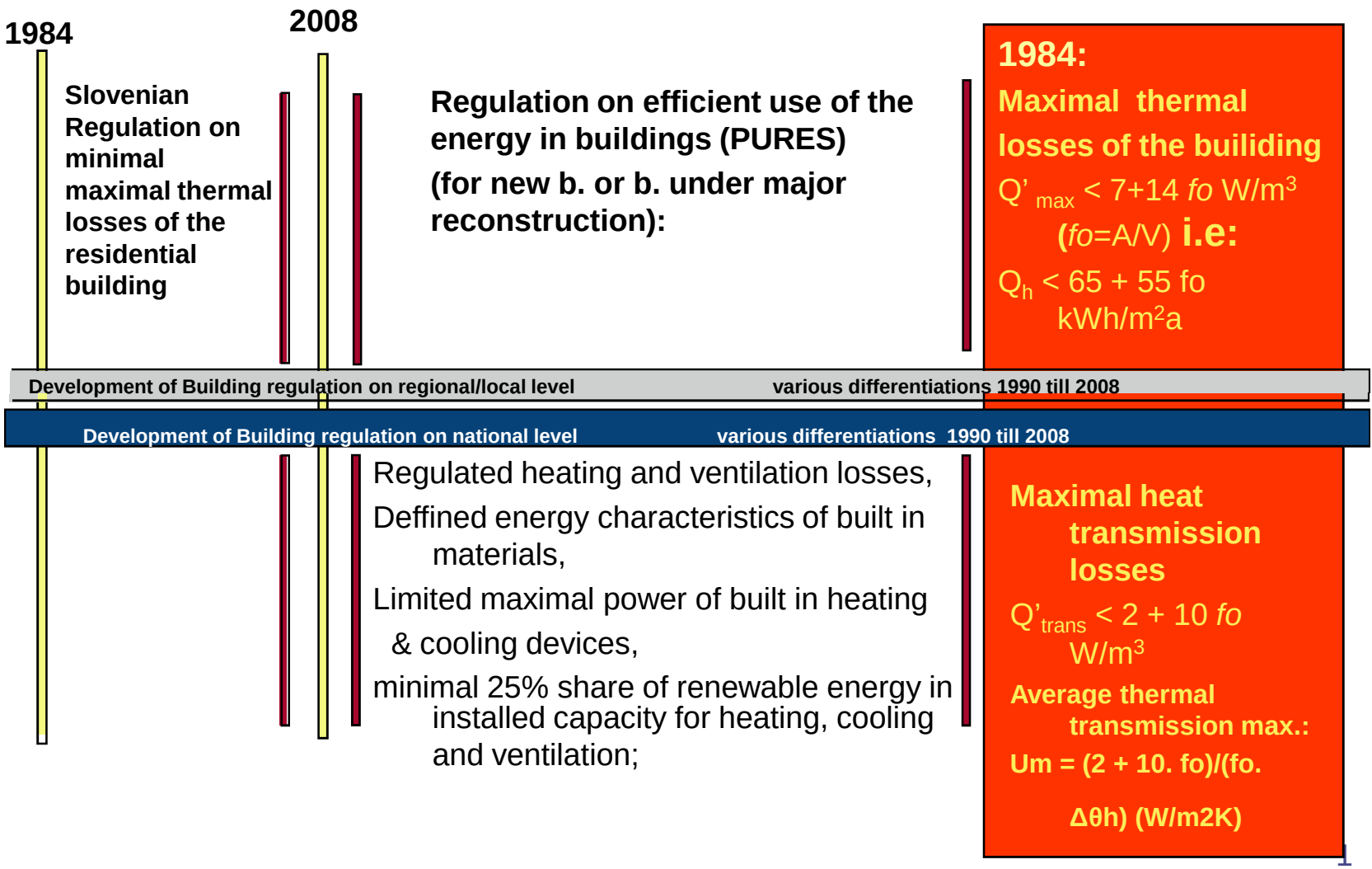
Since 1990 this act was amended or refered in other national law 20 times. Significant amendment was in 2005 by Act. No 479

- there is a new bulding law in preparation
- The Act No 555/2005 "On Energy Efficiency of Buildings"
- Decree No 625/2006 which implements the Act No 555/2006 defines the procedures and measures aiming at the improvement of the energy efficiency of buildings

Slovenia

Regulations for constrution

Regulations for urban planing



Intelligent Energy Europe

Hungary

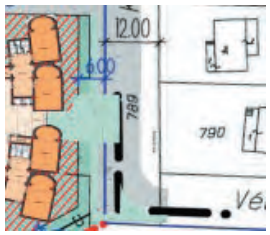
Regulations for construtions

1997/LXXVIII. Act on the development and protection of the built environment
1997

253/1997. Gov. Regulation on the national standards of urban planning and construction (OTÉK)

Zones, placing of and minimum space between buildings, utilities, protection of health and environment, fire protection, use of proofed materials, regulations for building permission

Based on these all the local authorities make "local building regulation"



Scale 1: 500 or 1: 200

7/2006. (V.24.) TNM on *laying down the energetic attributes of buildings*;

176/2008. (VI. 30.) Governmental decree on the *certification of energetic attributes of buildings* and

264/2008. (XI.6.) Governmental decree on *energetic inspection of boilers and air-conditioning systems*.

Regulations for construction: Development of Building regulation on regional/local level — **various differentiations 1990 till 2008**

Regulations for urban planing

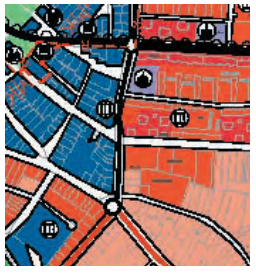
Regulations for urban planning: Development of Building regulation on national level — **various differentiations 1990 till 2008**

1996
XXI/1996. Act on regional development and physical planning

2003
XXVI/2003.
Act on National Physical Plan

Based on these all the local authorities should make its own physical (urban) plan

Scale 1:10 000



OTÉK was amended and modified in 2008. Now it is including several paragraphs which could be used for supporting EE planning.

Bulgaria

Regulations for construtions

Regulations for urban planing

1989 End of Communism

Regional / local regulation basic components – what is regulated?

Plan for building permission.
Scale: 1:100;200;500

Energy Efficiency Act
Ordinances on:
-Energy Performance of Buildings
-Energy Efficiency Auditing and Certification
- Technical Passports

Development of Building regulation on regional/local level — various differentiations 1990 till 2009

Development of Building regulation on national level — various differentiations 1990 till 2009

Energy Auditing Scheme
Certification
Technical Passports
Spatial Development Act
Urban planning and development

Typical plan for urban development
Scale: Depending on the area

The results from energy audits can be used for analysis on the municipal housing

Technical passports which includes the energy performance characteristics can be also used for housing estate planning

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Romania

Regulations for construtions

1990 Law 350/2001 on territory planning and urbanism

2007 Codul National al Constructiilor/ National building code

Main topics:
- Mechanical resistance and stability
- Security against fire and noise
- Energy efficiency and thermic proof
- Thermic rehabilitation of buildings
- Energy audits

Type of plans
(for building permission
Scale 1:100)

Thermic rehabilitation & modernization of the buildings and no building permission without energy certificate - OG 29/2000

The Energy Efficiency Law – 199/2000

O 22/2008 regarding energy efficiency and promotion of the reusable sources to end-users

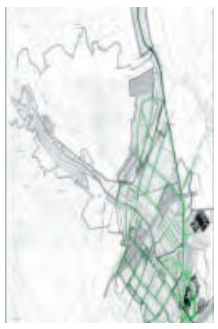
Development of Building regulation on regional/local level — various differentiations 1990 till 2008

Development of Building regulation on national level — various differentiations 1990 till 2008

Regulations for urban planing

2007 Codul National al Constructiilor

National building code:
- Territory planning
- Urban and building planning
- Authorization and building practices
- QA in building practices
- Use of proof materials
- Reduction of the seismic risks



Type of plans
Left: General Urban Plan
Right: Zone Urban Plan
Scale 1: 25 000

OG 29/2000 institutes the National Programs for thermic rehabilitation and modernization

Law 350/2001 on territory planning and urbanism

Energy Efficiency National standards

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Croatia

Regulations for construtions

Regulations for urban planing

Local authorities are not allowed to issue local binding rules stricter then set by national legislation.

Passive house

Municipalities and counties are in charge to issue location permit, general design approval, users permit.

All new buildings for which building permit or a general design approval is submitted after 1st September 2009 shall possess an energy certificate.

Regulations for construction: Development of Building regulations on regional/local level — **various differentiations 1990 til 2008**

Regulations for construction: Development of Building regulations on national level — **various differentiations 1990 til 2008**

National building code:

- Physical Planning Act (OG No. 30/94, 33/00, 100/04)?
- Construction Act (OG No. 175/03, 100/04)?

The Physical Planning and Building Act (OG No. 76/2007)

- Ordinance on Energy Certification of Building (OG No. 113/2008);
- Ordinance on the Requirements and Criteria to be met by Energy Auditors and Energy Certifiers of Buildings (OG No. 113/2008);
- Technical Regulations Concerning Energy Economy and Heat Retention in Buildings (OG No. 110/2008).

The application for building permit or the general design approval respectively shall be accompanied by a study of technical, environmental and economic feasibility of alternative systems for electricity supply (systems based on renewable energy sources,...)?

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