

Final Guidelines on the Process



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Madrid, November 2009

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1 Introduction

1.1 Background and aims of the ENPIRE project

All over Europe local governments are involved in projects to improve the quality of houses in the urban environment. This involves not only the development of new urban areas but increasingly also the restructuring of *existing* urban areas. Although improvement of the overall quality of the dwellings and of social conditions in the neighborhood will be the primary aim of such projects, there are also very good opportunities for improving the energy efficiency of the dwellings. Improvement of energy efficiency will not only contribute to the mitigation of climate change but can also help to stabilize energy costs for inhabitants. However, it is very important that the issue of energy efficiency is already considered at the most early stages of the urban planning processes so that optimal choices can be made with regard to energy infrastructure, energy efficiency measures and renewable energy generation.

Local authorities have a specific and very influential role in promoting and facilitating the process of energy efficiency in urban planning, and are often in the best position to take the lead in CO₂ reduction initiatives. In order to provide the different parties in the planning and decision making process with good information and best practice examples the ENPIRE project was started in January 2008. Within this project general guidelines have been developed and practical experiences documented with regard to energy planning in urban renewal projects (see also www.enpire.eu).

Three different Guideline documents have been prepared by the ENPIRE project, covering the following subjects:

- **Process:** how should the process of energy planning and preparation of an energy vision study be organized in order to achieve good results; guidelines on process show step by step the tasks, priorities and roles to overcome efficiently the initial objectives and goals.
- **Legislation and Ambitions:** which efficiency requirements are required by existing legislation in different countries and in what way can one set a ambition level that exceeds the legal requirements;
- **Embedding Agreements:** in what way can a certain ambition level for energy efficiency or CO₂ reduction be agreed between stakeholders and laid down in a joint agreement.

Apart from these Guideline documents a number of local projects involving urban planning and energy visions studies have been implemented in:

- Albertslund, Denmark
- Ávila, Spain
- Breda, Netherlands
- Casale, Italy
- Dublin, Ireland
- Havířov, Czech Republic

Practical results and lessons from the above projects have been collected in the "**Evaluation Report of Local Projects**".



Finally our key recommendations and lessons are described concisely in a special brochure titled: "**Energy Efficiency in Urban Restructuring Projects: Bridging the Gap between Ambitions and Practice**". All these documents can be downloaded from the ENPIRE website or by contacting the project coordinator (W/E Consultants, email: info@w-e.nl).

1.2 Objective and Overview of this document

This paper presents guidelines on the process of energy planning. The document shows the different steps in the energy planning and decision making process within urban planning in municipalities, presenting good information and best practices from real cases in order to achieve the targets for energy efficiency, renewable energy and reduction of greenhouse gas emissions.

The document presented hereunder is that one that should be followed by all the stakeholders involved in the organization on the energy plan within the urban planning. Different issues on how to distribute the roles and responsibilities, priorities and tasks between stakeholders, how to establish the agreements between them, which legislation should be accomplished, and how to focus the energy study of existing or new buildings, is the information needed to avoid that the initial energy goals fixed by actors involved in the beginning of the process are not lost during it.

The very fact that stakeholders work actively on the plan contributes positively to increase awareness at the local level, because tenants and inhabitants feel a part of the process and involved within it. The energy plan should be adopted as a part of the local policy and become an integral part of the municipal planning.

2 Steps In The Planning Process - Organising The Energy And Urban Plan Work

2.1 Introduction

New approaches towards sustainable urban planning must include aspects of clean energy and energy efficiency in the process. Municipalities play an important role in the accomplishment of the objectives fixed by the national energy and environmental policies. Developing a local energy planning within the urban planning is a decision that municipality local authorities should take into account, in order to achieve the targets for energy issues: rational use of energy, renewable energy and CO2 emissions.

Local administrations can engage in the development of an effective energy plan because they can promote the use of high efficiency solutions within the urban planning development, using incentives, regulations, and leading real cases. The results of these practical cases will demonstrate to the target groups the effectiveness of the mentioned planning allowing the raising of their awareness. in the introduction of sustainable solutions renewable energy and energy efficiency in the process of urban planning.

Although there are common interests for all the involved parts in the process, such as costs decreasing, sustainability increasing, better life quality, etc... the reality is that these interests are not reflected in the solutions that are being implemented nowadays in new or refurbished buildings, surrounding areas and public facilities.

The preparation of a local energy plan as an integrated part of the urban planning programme means a complex process with many different stakeholders and issues to take into account. It requires specific knowledge and experiences, and an efficient interaction amongst the relevant actors and decision-makers involved in the process, thus the importance of setting-up common guidelines and instruments to facilitate the integration of sustainable energy use into urban renewal schemes. ENPIRE guidelines will help main actors to know when, how, and which steps should carry out to develop the energy plan, and the main roles, distributions, priorities and tasks to overcome the process.

The main steps of the energy planning process within the ENPIRE project are:

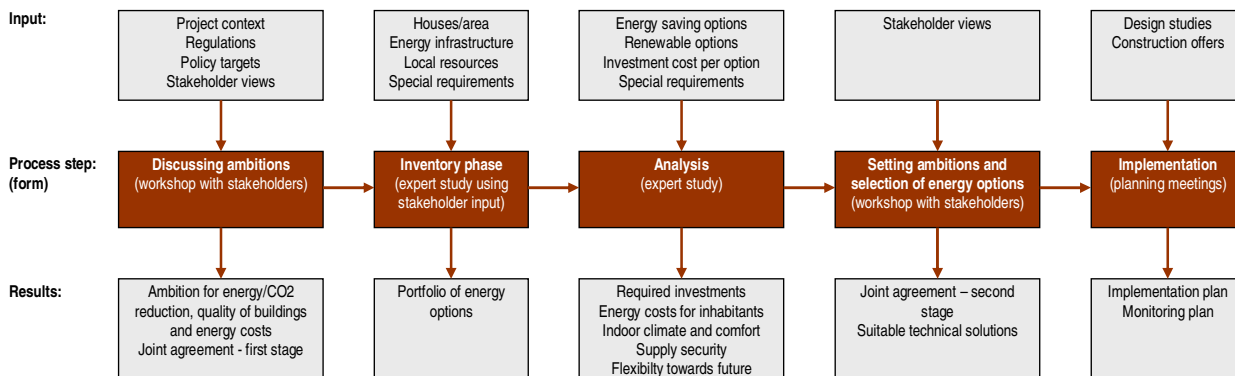


Figure 1. Scheme for the process of energy planning

The main steps in the scheme described above may or may not be applicable for each specific project but overall, the steps described above give a good idea on how the energy planning should be organised.

Process steps in the energy planning process:

Discussing Ambitions: In this first step ambition level of the project will be discussed between stakeholders. Themes in this discussion can extend to more than just the reduction of energy consumption and/or CO₂ emissions, but also related to the quality of the buildings with respect to its technical state, indoor climate, comfort levels and energy costs for inhabitants. CO₂/energy ambitions will be regarded in relation to national and local regulations, climate policy targets and the overall project context (type of buildings, area, prospective users). A first agreement on the overall ambitions may be laid down in joint agreement document between local authorities, investors and prospective users.

Inventory phase: In this step all information is collected to characterise the project area, local resources of renewable energy, present and future energy demand of buildings and building users, existing energy infrastructure, technical characteristics of the buildings, comfort levels, indoor climate requirements, and various social aspects. Also planned developments in adjacent areas may be considered as they may affect the possibilities for new energy infrastructures and certain collective solutions (e.g. activities generating waste heat or expected increases in heating/cooling demand). For this inventory a good input from the stakeholders will be necessary to obtain all relevant information. Based on the inventory a portfolio of potential energy options can be prepared.

Analysis: The analysis step builds further on the inventory phase by analysing the most promising energy options in terms of expected energy/CO₂-reductions, required investments, and energy costs for inhabitants. Also the analysis study will address issues like security of energy supply and the flexibility of each concept with regard to future changes in the energy context.

Setting ambitions and selection of energy options: Based on the detailed analysis results the original ambitions need to be revisited, leading to either a reconfirmation of the ambition level or a down- or upwards modification of the original ambition. A broad support of the decisions reached in this phase by all stakeholders will be crucial for the further success of the project. Also a decision may be made about the most suitable combination of energy measures that can achieve the agreed ambitions at acceptable costs and that also meets the additional requirements that were formulated in the first two steps. Identification of potential bottlenecks during the following phase of implementation and possible solutions for these bottlenecks should be addressed already at this point.

Implementation: The implementation phase is of course the most important part of the process, and in many cases also one of the most challenging. This phase involves other actors with other interests than previous steps and it has its own dynamics. Several measures can be taken to help in maintaining the ambition level intact and to monitor the (intermediate) achievements.

2.2 Discussing Ambitions

Municipality local authorities must decide how to develop the urban plan and what are the critical success factors and the motivation to include energy issues within the urban planning. To develop the plan there should be a consensual on the energy/CO₂ reduction targets and procedures amongst the relevant groups and stakeholders involved in the process that will be the basis of the decisions to take within the energy planning process. (See Deliverable D18 – Embedding Agreements)

These energy goals should be set in according to the regulation -CO₂ emissions targets- and the considerations contained in the urban planning, taking into account that those energy consideration do not interfere with other criteria, such as security of supply or economic issues. (See Deliverable D17 – Ambitions and Legislation)

Motivations to make plans are different between stakeholders and municipalities according to different national conditions, needs of new/refurbished buildings, public facilities or surrounding areas, or their own interests and agenda. It is important to know these motivations in order to organize the best programme adapted to each municipality and the best criteria and goals to get a common decision-making process.

The principal actors involved in the process are:

Local Authorities: The municipality administration has the compromise of contribute to the reduction of national energy consumption and the correct organization of land. It should contribute to accomplish the target goals of national energy and environmental policies. They are obliged to promote the decreasing of energy costs, the CO₂ emissions, and the improvement in the social infrastructure and the quality of life for the municipality, so local authorities play a key role and have a common responsibility in the development of the process. Different segments of local authorities should be involved in the process in order to join efforts and achieve final goals.

Housing associations: They are independent non-profit bodies whose primary objective is to provide low-cost social housing for the habitants that need this. The main objective of the ambition discussion will be to get a reduction of the total costs of living in these houses and the improvement of quality of life. When housing associations are involved in the process they have a key role in the decision-making of the process.

Project developers / Constructors: They are interested in getting an economical profit and positive market image and they are responsible to materialise the project, bearing in mind the increasing of dwellings value (increasing the comfort and indoor climate conditions and dwelling quality, and decreasing the energy costs associated to their constructions). Project developers are directly involved in the process because they are responsible of the organization of the investments and they are responsible for the dwellings exploitation. Constructors are not directly involved in the first steps or the process because they are responsible of the development of the technical solutions. They do not usually need to make a decision on when or where proceed but they are an important part of the process because they are responsible to materialise the project.

Constructors are a very important piece of the process when houses are private because normally they are the people in charge of the development of all the building project (design, civil engineering, facilities engineering, architectural issues) so they are free to choose materials, equipment, heating and cooling systems and so on, so at the end of its construction the building could show and high efficient image.

Other important actors involved in different parts of the process are:

Tenants / Inhabitants: They not always play a direct role within the process, especially in new construction projects, but they should be informed and involved in the process. The main issues where tenants / inhabitants should express their viewpoint are regard to quality conditions of dwellings and services, comfort degree, and about energy costs to support.

Local Energy Agencies: They are usually related to the municipality authorities and are responsible for promoting a reasonable use of energy in the local area. Energy agencies could play a significant role promoting the relations between the other involved parts and deciding different energy related issues.

Energy Company: The companies supplying heat and electricity to dwellings and surroundings often must be an active partner in the process of energy planning, because existing infrastructure is not always suited for the new requirements and new demand so in many cases the infrastructures should be restructured.

To achieve initial energy targets is strictly necessary to obtain involvement of community stakeholders. Local authorities should prepare meetings with tenants, citizens, energy supply companies, constructors and promoters, etc... in order to demonstrate the ambitions of actors.

These parties involved in the process (local authorities, housing associations, project developers, tenants...) have to agree on the level of energy saving and CO2 emission reduction they want to achieve, according to the existing legislation and other criteria (See Deliverable D17 – Ambitions and Legislation). A solid agreement (See Deliverable D18 – Embedding Agreements) on those ambitions is very important to not only to make clear what the final goals are, but also on how to cooperate and to divide responsibilities.

Good organization of the process will allow achieving the greatest results through the establishment of administrative and political agreements and methodological procedures. All stakeholders and actors interested in the process should work and agree all decisions together, and assume their responsibilities within the process in order to accomplish correctly the energy goals. It is important to clarify from the very beginning of the process the purpose of the plan, the actors' responsibilities, and must ensure a strong coordination amongst them.

2.3 Inventory Phase

The inventory of the current situation will provide a photograph of the current energy situation (energy use and CO2 emissions) of the area to construct or to be refurbished. Based on this initial situation, local authorities can draw up a strategy and estimates energy consumption growth and energy targets for the medium term, always taking into account the legal conditions, promoting best practices and energy efficiency measures necessary to accomplish them. A good way to assess the municipality issues and goals related to energy is to invite housing association's representatives, neighbourhood groups or tenants to discussions because they can make their viewpoint and really arouse public support.

The framework where the process starts will be defined through:

- Building conditions, climate indoor, insulation materials, kind of energy supply, energy infrastructure, local resources and description of facilities processes and technologies in building and surroundings.
- Current building energy consumption and state. Energy Performance Certification calculated using methodologies and tools available according to the law.

The inventory will be useful because it is obviously necessary to know how energy is being used in the area to construct or to be refurbished; it will be the base of decisions in the future. Different measures to achieve potential savings will be listed in the inventory.

From the results of the current situation, a portfolio of energy options will appear so the possibilities of achieve the energy reductions targets and the efforts to accomplish them will be analysed.

Description of current energy situation depends on the type of action to carry out:

- Construction of new dwellings
- Refurbishment of existing dwellings.

In case of new dwellings construction, important issues to be analysed in order to describe current energy situation and needs will be:

- Existing energy infrastructure around the area that could be expanded to connect new urban developments. Actions related to energy infrastructures are difficult to achieve so it is necessary to carefully know the situation in the local area.
- Local characteristics of land and local climate. These parameters could focus technical parameters of dwelling construction and the energy options.
- Existing local energy resources – description of the potential local energy resources that could be exploited, both technically and economically.
- Expected occupation of dwellings – in order to accomplish a good land use, a good design of dwellings and to define type and number of dwellings to construct
- Surface of dwellings to be constructed
- Expected inner conditions (comfort level, indoor conditions) – limiting factor for the energy consumption
- Energy needs of new developments – Assessment of the energy demand of new dwellings,

in accordance with the law.

- New planned developments in adjacent areas
- Minimum Energy Performance Rating level allowed by regulation

Main issues to analyse the current situation in case of zones to be restructured, are:

- Existing energy infrastructure in the nearby in order to analyse if new energy consumptions of dwelling is according to the existing electric infrastructure
- Local climate characteristics. These parameters could focus technical parameters of dwelling construction and the energy options.
- Existing local energy resources – description of the potential local energy resources that could be exploited, both technically and economically.
- Current energy supply system in existing dwellings and public facilities in the surrounding area (all electric, electric + gas, district heating...) – description of energy consumptions and costs; first idea on how electric or thermal energy efficiency measures could impact in the process
- Existing dwelling characteristics: isolation, glazing, deterioration degree or main current operation existing problems – Description on the state of the building to have an initial idea of the energy possibilities to proceed and implement
- Social issues – Related to economic strength of income tenants, provision and prejudices to new technologies, satisfaction degree with existing dwellings conditions, or feelings of tenants or citizens with existing problems or bad experiences with previous actions
- Building quality or comfort levels
- Existing limitations, such as available space to implement new technologies, maximum height, or buildings components to protect or preserve (i.e. facades), etc...
- New planned developments in adjacent areas
- Energy performance of existing buildings and minimum Energy Performance Rating level allowed by regulation

In case of refurbishment of existing buildings the best way to know where and how save energy is to carry out an energy audit by an external consultant, that will help to identify the potential energy and economic savings based in the current use of energy in dwellings. The energy study will define the actual energy consumption and its distribution so it will be a perfect picture of the actual situation and will allow choosing the better energy options and energy efficiency measures to implement.

The inventory on the existing situation will help to support or dismiss general action lines and focus the process in the real promising options. The potential for energy reduction comes from the difference between the current measured energy consumption and consumptions fixed by legislation.

2.4 Analysis of energy options

The inventory of the current situation provides the necessary input for the Analysis step in the form of a collection of energy saving or energy options.

Stakeholders must decide the energy options they are interested in according to the current energy situation of the area, the financial resources available within the process and the common energy ambitions and targets. Next step, lead by technical stakeholders in the process (consultants, architects, etc...) is to carry out the assessment of each one of the energy options, describing energy and economical savings, payback period and taking into account financial, environmental and political effects. It is important to define an implementation methodology that will help to prioritize measures according to how they could be better applied according to the conditions of the municipality.

Energy efficiency measures could be divided in different levels depending on the state of dwellings and progress degree of the construction or refurbishment project.

- LEVEL 1: URBAN COEFFICIENTS
- LEVEL 2: SITE LAYOUT
- LEVEL 3: DISTRICT SOLUTIONS
- LEVEL 4: COMPONENTS SOLUTIONS

LEVEL 1: Urban coefficients:

Local regulations oblige to meet a number of defined indicators and parameters that must be satisfied, such as urban building coefficients, which physically characterize the buildings:

- Floor area ratio - determines the maximum building surface in the development area
- Shape factor – i.e. maximum height in relation to the building surface

In new constructions of buildings the accomplishment of these urban coefficients imposed by local regulation will help to accomplish energy efficiency targets, because density level degree give an idea of the energy consumption range. I.e. low density schemes are less efficient in energy consumption because their bigger losses due to larger fluid / power grids and less compact buildings, or when higher a building is, the more energy consumption in elevators and water pumps necessary so less efficient it is.

LEVEL 2: Site layout:

The distribution and orientation of dwellings and spaces within the dwellings should be that one that allows the best energy use according to the energy demand. Usually dwellings and/or spaces with bigger energy consumption should be place in the most favourable areas, maximizing solar gain – buildings orientated with the longest face to the south, better to the easterly south than to the westerly south, as this maximises the early morning gains. Shadows on the side facing to the south must be taken into account, as this phenomenon could reduce solar gain. Also distribution of building and vegetation and planting within the area is important to facilitate a microclimate; avoiding northern winds and enhancing retain solar access.

This construction decision will contribute to the energy efficiency targets, because dwellings

maximize the hours of natural light so in this way the use of electricity for lighting and for heating and cooling systems is better optimized.

Both issues (Level 1 and level 2) described above should be carefully considered in the local urban regulations, so municipalities should carry out an exhaustive review of local regulations in order to consider (if not considered yet) these aspects and make a transposition to the local regulation. Stakeholders involved in the phase of building design and construction must taking carefully into account urban coefficients and orientation of dwellings and spaces within the development of the design and construction project.

Level 3: District solutions

District heating and cooling systems are solutions to be considered in energy and urban planning because they mean relevant solutions respecting to energy efficiency, security of supply and environmental impact; they reduce and substitute primary fossil fuels with local available sources. This means reducing the carbon dioxide emissions and boost local economy as well.

A district energy system is capable of providing heating and / or cooling, and often these systems are linked to electricity generation facilities and therefore can also provide power. It depends on the needs of each municipality. The different designs based on these needs are:

- Combined heat and power generation
- District heating
- District heating + cooling
- Geothermal heat
- Change from individual to central heating/cooling

Other advantages besides those already mentioned are those one derived from the management of common utilities and energy bills.

These kinds of solutions are really attractive in a larger scale and some of them are only attractive in new constructions. Bui it could be consider improved efficiency or greening of an existing district heating system or even a change from individual to central heating/cooling system. Also it is very important to consider the distribution network or grid in order to select the heat source.

Level 4: Components solutions

The renewal or selection of certain building components might be the easiest way to improve energy performance in existing dwellings, in some cases with very low investments.

Energy efficiency actions could take place in:

- Inner distribution - Passive Solar Design: Distribution of inner spaces may increase the energy efficiency in dwellings raising solar gain and natural ventilation. If a new distribution of the spaces is going to carry out in the refurbishment of the spaces, main rooms and places with bigger energy consumption should be oriented to the south.
- Isolation and glazing: The objective is to reduce heating losses to the maximum in the building envelope, applying energy efficiency solutions in walls, roof and floors.

- **Materials:** The energy use by a building could be reduced using materials that require low energy for manufacture, both in new constructions than in existing refurbishments.
- **Appliances and facilities:** These systems provide main services to dwellings and surroundings areas and are usually the major energy consuming systems. Many times, there is a big potential for the introduction of renewable energy technologies, such as photovoltaic cells, solar water heating, or biomass into different developments.

In case of new construction of buildings, the election of this kind of issues should correspond to the architect and/or designer of the building in order to choose the better combination taking into account aesthetic and functional criteria, bearing in mind, solutions must meet the energy reduction consumption goals establish in each case.

These four levels presented above may or not be viable in each specific project, but the process gives a good overview on how to start in the analysis of energy options.

The analyse of the energy options will show a shortlist of the most promising options to save energy and/or reduce CO2 emissions. A detailed analysis of the options above will be made considering different measures packages, where each one of them could be evaluated as a whole. The different packages should be technically viable and meet both demand and supply options. Each one of the packages should be composing, bearing in mind:

1. The demand reduction options – through reduction of energy loss
2. The renewable generation
3. The most efficient conversion techniques for fossil fuels

The main stakeholders should asses both energetically and economically each one of the energy packages proposed. The analyses of each one of the best practices or energy efficiency measures should review following issues:

- **Energy and economic evaluation of each solution:** Each energy option should be carefully described:
 - Description of the measures – Description of the solution remarking advantages and disadvantages of proposed situation compared with the initial one and the equipment or devices to implement
 - Annual energy savings, compared to the initial situation
 - Annual economic savings, compared to the initial situation
 - Annual CO2 emissions, compared to the initial situation
 - Annual primary energy consumption, compared to the initial situation
 - Annual energy cost per habitant, compared to the initial situation
 - Investment needed to implement the solution – Investment cost, maintenance costs-
 - Payback period
- **Other criteria to evaluate:**
 - Possible conflicts with architectural or legal requirements
 - Availability of sources
 - Security of energy supply
 - Future problems related to energy demand or infrastructure: management of facilities, possibilities of enlargement of the area, etc.

- Unforeseen problems (difficulties that could appear during the implementation of measures)

The main stakeholders involved in this part of the process are the energy technicians involved in the process (consultancies, architects, etc...) that will carry out the assessment of the technical solutions and energy efficiency measures in coordination with the other stakeholders involved in the process. Anyway, the decision making should be concrete among all stakeholders involved in the process.

2.5 Setting Ambitions and Selection of Energy Options

Based on the detailed analysis of energy options, the initial energy ambitions should be revised, reconfirming the ambition level or proposing a modification of the original ambition. The decision also must be focused on the most suitable combination of energy measures, according to technical feasibility, acceptable costs and other requirements to accomplish. Identification of potential bottlenecks during the following phase of implementation and possible solutions for these bottlenecks should be addressed already at this point.

Some of the criteria to consider for the prioritization in the implementation of measures in order to get the greatest results according to the energy targets are:

- Energy saving reasons - reducing energy use and dependence on fossil fuels
- Economic saving reasons - decreasing cost of energy bills implementing energy efficiency measures and best practices (related with financial resources as well)
- Habitability conditions arguments - increasing dwellings conditions in terms of comfort and safety, taking advantage of daylight in those possible cases
- Market arguments - improving public image of municipality and local authorities and increasing marketability of different solutions implemented

Based on all the information above, and according to the ambitions, stakeholders may then decide on the best way to achieve the energy/CO₂ reduction targets set out in their agreement. Also it is important to inform and involve other stakeholders than project developers or building owners in the decision-making

2.6 Implementation

The energy process to be developed within the urban planning means a more sustainable policy for the municipality. This kind of planning is not just a question of budget, but also of organization, ability to make decisions and common sense. Timing is also important.

To get a successful implementation of the results, a strategy should be detailed and described in order to define clearly the responsibilities, organizing stakeholders' tasks to get an effective coordination amongst them. Local Authorities might be the leaders of the process, but all actors should contribute actively to get the greatest results.

Implementation of energy efficiency measures need to be an organized process in order to get the better construction and installation of appliances and solutions. Many obstacles could arise

that could oblige to delay, modify or even cancelled the plans. The nature of these obstacles could be technical, financial or organisational. In order to reduce all the risks some arguments should take into account:

- Documentation and management of the energy plan:
 - A route plan with intermediate targets helps to keep the process on track
 - Milestones of possible problems
 - Communication programme towards the parties involved in the process
 - Responsibilities and roles of the involved actors
 - Regular updates on the energy study to see project delays, etc...
- Monitoring of the achieved reductions. This activity will help to account the achievements and to avoid energy losses. A good maintenance programme will help to avoid problems and to realize good results in the energy targets.

3 CONCLUSIONS

Local Administration plays an important role in the accomplishment of the objectives fixed by the national energy and environmental policies so the local energy planning will allow accomplishment of the energy goals. Municipality authorities They should promote energy efficiency activities and renewable energy sources use within the urban planning development. The objective of setting-up common guidelines and instruments is to facilitate the integration of sustainable energy use into urban renewal schemes.

Local energy and urban planning is a complex process with many different issues to take into account and decision-makers involved. where stakeholders should work together in order to have good coordination and a clear distribution of the responsibilities, to achieve the greatest results as possible.

The development of an energy plan within the urban planning in a municipality need time to verified good results from a successful implementation of the energy options.

4 BEST PRACTICES

Different real cases involved in ENPIRE were interested in refurbishment of existing areas and buildings because of low energy quality of dwellings, because of social problems in the neighbourhood, or no healthy indoor climate and comfort level of houses. A related problem in line with this above is the poor rent for investments of dwellings. In almost all ENPIRE situations, the housing association is the owner of houses, so investments in energy savings should be done by the housing association, because in most cases the tenants rent could not be raised. This is called "split incentive", and in many cases could be an obstacle to implement energy savings.

In all local projects the decision making process takes several years. This means that the ENPIRE project covers only a short period of time in the whole process of urban planning of the local projects. This makes it difficult to get a full picture of the whole process and to see if the initial goals have been achieved.

The main stakeholders in the considered projects are the local authorities and housing associations. The tenants and inhabitants have been asked and informed in some of the cases but not always play a significant role in the development of the process. In almost all the cases the stakeholders are interested in raising the quality of dwellings and keeping a healthy housing stock in order to control costs and to increase the indoor climate and comfort level. The local authorities have a key role in the process; because they have the compromise of contribute to the reduction of national energy consumption and the correct organization of land. It should contribute to accomplish the target goals of national energy and environmental policies. They are obliged to promote the decreasing of energy costs, the CO₂ emissions, and the increasing quality of life for the municipality. Energy companies have also an important role because the existing energy infrastructure could have a big influence on the feasibility of energy ambitions.

Most energy options proposed in the local projects in ENPIRE are on building level: higher insulation level, better glazing and better ventilation system (not always considered).

Energy options considering the energy infrastructure or district solutions are not considered in most of the local projects. Energy saving on lighting is an option but will be dependent on preferences of the inhabitants, so its effects are more uncertain. In some cases the local resources have been an option, as using biomass for heating.

Low rent is a problem because in many cases it can not be raised, so financing the investments is the main bottleneck in these kinds of projects. Within ENPIRE projects the implementation phase of measures has not been reached so ENPIRE could not respond to the implementation results questions.

4.1 Albertslund

- Albertslund focuses on the process and the stakeholders.
- Involvement is very important and to create a clear process.
- Other countries can learn much from this process in Albertslund, and it can be replicated to other municipalities in Denmark.

4.2 **Ávila**

- Economical issues are the final reason to choose or not a saving option.
- Use of the software developed by the Housing Minister (CALENER and LIDER) and therefore only valid for Spain.

4.3 **Breda**

- The choice for well known techniques improve the chance of realization
- A good project manager is very important.
- The local authorities can stimulate energy saving projects by responding to future developments of energy legislation.
- The energy investments will be (partly) financed by raising the gross rent of the dwellings. For tenants the total housing costs will not rise because of the 'Woonlastengarantie' (the Municipality of Breda guarantees no rising of total housing costs).

4.4 **Casale**

- The ability to collaborate and integration among services can help achieving savings of natural resources and materials and improving the urban quality of life.
- In order to develop on a large scale, projects should be implemented within a common methodology for planning, supported by local regulations, such as local building regulations, providing for reductions in charges for eco-buildings.
- A change in citizen's perception, supported by the cost reduction of eco-technologies in the market.

4.5 **Dublin**

- It is necessary to incorporate the approach into a standard policy document for use by NABCo's numerous member groups comprising of cooperative and self build groups as well as for use by other similar housing associations.
- Simplicity will be important and other construction types will need to be considered.

4.6 **Havířov**

- It is important to define the needs and interests of all stakeholders.
- The ability of partners to co-operate would be beneficial for the whole area in terms of energy savings, CO₂-reduction and improvement of the quality of life.
- In case of the Czech regulated rental sector the investments in energy efficiency measures and CO₂-reduction can not be paid back through increased rents. The local authorities have limited possibilities to stimulate energy saving projects.