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D5
Socio-economic Analysis on Barriers and Needs

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RE	Restricted to a group specified by the consortium (including the Commission Services)	
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D5
Socio-economic Analysis on Barriers and Needs

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Content

Preface

The BRITA in PuBs project is an EU-supported integrated demonstration and research project that aims to increase the market penetration of innovative and cost-effective retrofit solutions to improve energy efficiency and implement renewable energy in public buildings all over Europe. Firstly, this will be realised by the exemplary retrofit of eight demonstration public buildings in four European regions (North, Central, South, East). By choosing public buildings of different types such as colleges, cultural centres, nursery homes, student houses, churches etc. for implementing the measures, it will easier to reach groups of different age and social origin. Secondly, the research issues include a socio-economic research study identifying real project-planning needs, financing strategies, the development of design guidelines, the development of an internet-based knowledge tool on retrofit measures and case studies and a quality control-tool box to secure a good long-term performance of buildings and systems.

Bringing Retrofit Innovation to Application in Public Buildings – BRITA in PuBs is therefore a leading project within the EU ECO-BUILDINGS programme. The ECO-BUILDING concept is expected to be the meeting point of short-term development and demonstration in order to support legislative and regulatory measures for energy efficiency and enhanced use of renewable energy solution within the building sector, which go beyond the Directive of the Energy Performance of Buildings (EPBD).

1 Introduction

1.1 Overview

The Work Package 1 (WP1) of the Brita project deals with the sosio-economical analyses as input for the other work packages in the project. The studies results in three reports:

D5: Socio-economical analyses of barriers and needs
D6: Communication guide
D7: Overview of financial schemes

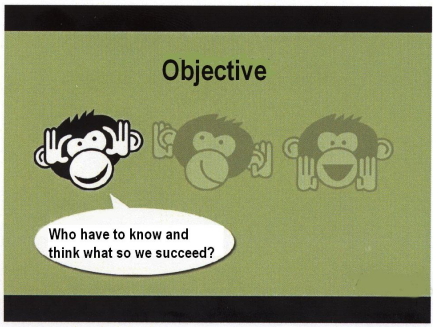
This report includes the background study for all these reports, but the results of the financial schemes and the conclusions for the communication report based on socio-economic analysis of barriers and needs are given in separate reports.

1.2 Analysing the needs

In spite of showing a reasonable cost-benefit ratio, energy conservation and renewable energy technologies are rarely introduced in everyday building projects, either in new-buildings or in renovations, for private or public buildings. There seem to be several barriers stopping this introduction. Therefore analyzing the real project planning and decision-making barriers in terms of project needs was an important part of work package 1 (WP1).

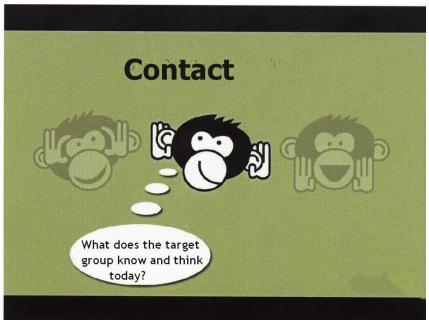
The work in WP1 is nearly a market analyzes, followed by the development of a good marketing strategy. To this end, eyes and ears have to be used to find out how the situation is today, before thinking about the best communication strategies to formulate a clear message to target groups.

Objectives



Who has to know and what does he/she have to think in order to succeed?

Contact



What does the target group know and think today?

Communication

Create the right message to right target group using the right channels

1.3 Barriers – why are our solutions not chosen?

One of the main goals of the BRITA project is to increase the use of innovative energy saving and renewable energy technologies. Looking into the barriers against choosing these solutions in public administrations we started looking at why and how we do choose.

During the building planning process, choices and strategies result from knowledge, know-how and evaluation. It is important to evaluate not only about how decisions are made, but also when the decisions are made. To this end, information is needed on the different phases of the building planning process and on who is involved in the different phases.

1.4 Dividing the work into parallel lines

Investigating deeply into the questions about barriers, it was soon found that there are different lines of work that has to develop in order to fully understand their complexity.

- Barriers: develop a market analyses including questionnaire
- Building process – find/develop a structure/overview of the process, what stages, and who are involved in these different stages, and when is the decision or terms of innovative energy saving and renewable energy technology made?
- Information search – where/how do target groups search for information?
- Financial schemes – what is available and how do the schemes work? The results are presented in a separate report, D7.
- Communication guide – to analyse the results from the tasks above, and to develop the communication strategy to overcome the barriers. The results are presented in a separate report, D6

2 Literature review

2.1 Method

A classical approach was used, started with a literature review. This helped to define the problem and design questions that later constituted the core of a questionnaire for further consultations.
The objective of the literature review was:

a. To determine what have been done before. Researchers were contacted to investigate if they had done similar studies in other projects or to learn about other similar studies. Networks in each country were used as well as the internet.
b. To learn about the common perception about barriers. Information was collected from the research partners on their thoughts about barriers. This was very useful for detailed review on barriers and developing the questions for the interviews.
c. To know where and how the decision makers search for information.
d. To compile information about financial schemes, what kind of schemes do the researchers in this project know about, which ones are used in the demonstration buildings included in this project.
e. To understand building process schemes and to investigate if there are already some schemes that can help to understand the decision making process. It was important to determine if this varies in different countries as well.
f. To collect communication guidelines as existing examples.

2.2 Results of the literature review

Some good reports were found on how the building sector searches for information, barriers on energy savings and building process. Unfortunately several of the most useful ones are in Danish and Norwegian, and not readable for English speaking people.
The best results of the literature study are listed below. The most useful information is summed up on the following pages.

1. Barrierer for energibesparelser i kommuner og kommunale institutioner. (barriers on energy savings in municipalities and municipal institutions)
   Kommunernes Landsforening for Energistyrelsen, Copenhagen, Denmark sept. 2004.
2. Kvalitativ analyse af målgrupper og disses informationsindsamling og videntilegnelse (Qualitative analyses of target groups and their collecting of information and knowledge) . Executive Summary. Alsted research as. For BYG-ERFA, EFP-formidlingsprogrammet og By og Byg. Denmark , Sept. 2001
3. Å bruke informasjon strategisk. (To use information strategically, information brochure) Statens Informasjonstjeneste, Oslo, Norway 1998
4. Marketing management. Philip Kotler, Northwestern University. Prentice-Hall, Inc. USA 2000.
5. Byggherrens prosjekteringsnøkkel. Norges byggforskningsinstitutt, Oslo nov. 2003
6. Recommendations for specifying Sustainable Development in the building process. EU project HQE^{2}R Sustainable renovation of buildings for sustainable neighbourhoods, contract no EVK¤-CT-2000-00025, deliverable 21, 2004
7. IEA annex 40 Commissioning of buildings and HVAC systems for improved energy performance, 2004. www.commissioning-hvac.org/Private, final report. http://www.commissioning-hvac.org/

8. The project delivery process at Stanford, Stanford University, California, USA 2001. Http://CMP.Standford.edu

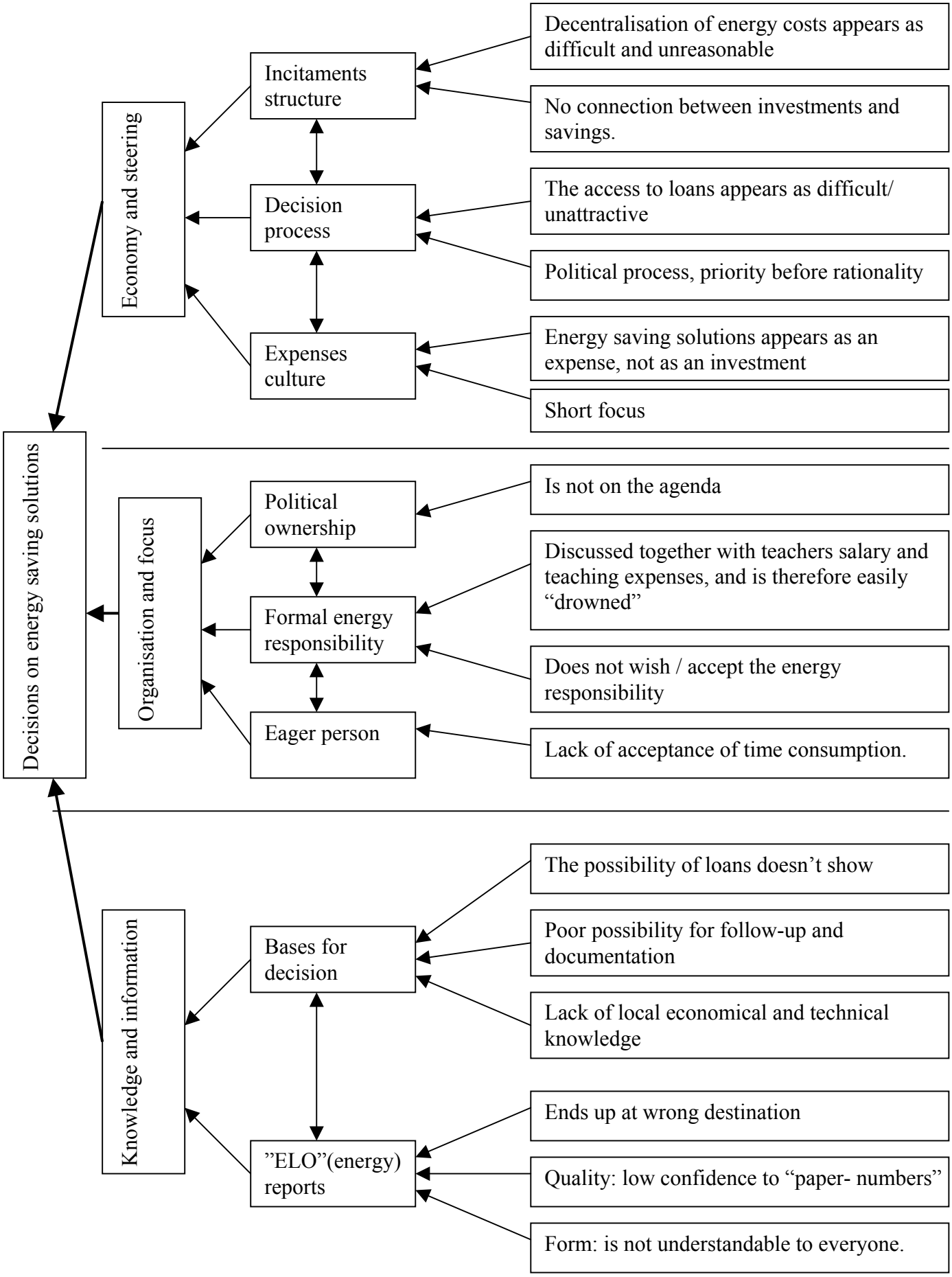
2.2.1 Barriers on energy savings at municipality level

This review [1] was orientated to investigate barriers for energy savings in municipalities. Schools were chosen as examples for municipalities' responsibility. A literature review was done on studies in Norway, Denmark and Sweden. It has been found that there is a lack of studies on barriers. Then qualitative interviews were done in ten chosen municipalities in Denmark. The definition of energy saving measures in this study seems to be all kind of energy savings (including user behaviour), compared to our focus of bringing innovative (low energy) solutions to application in public buildings.
The primary barriers found in this review are shown below.

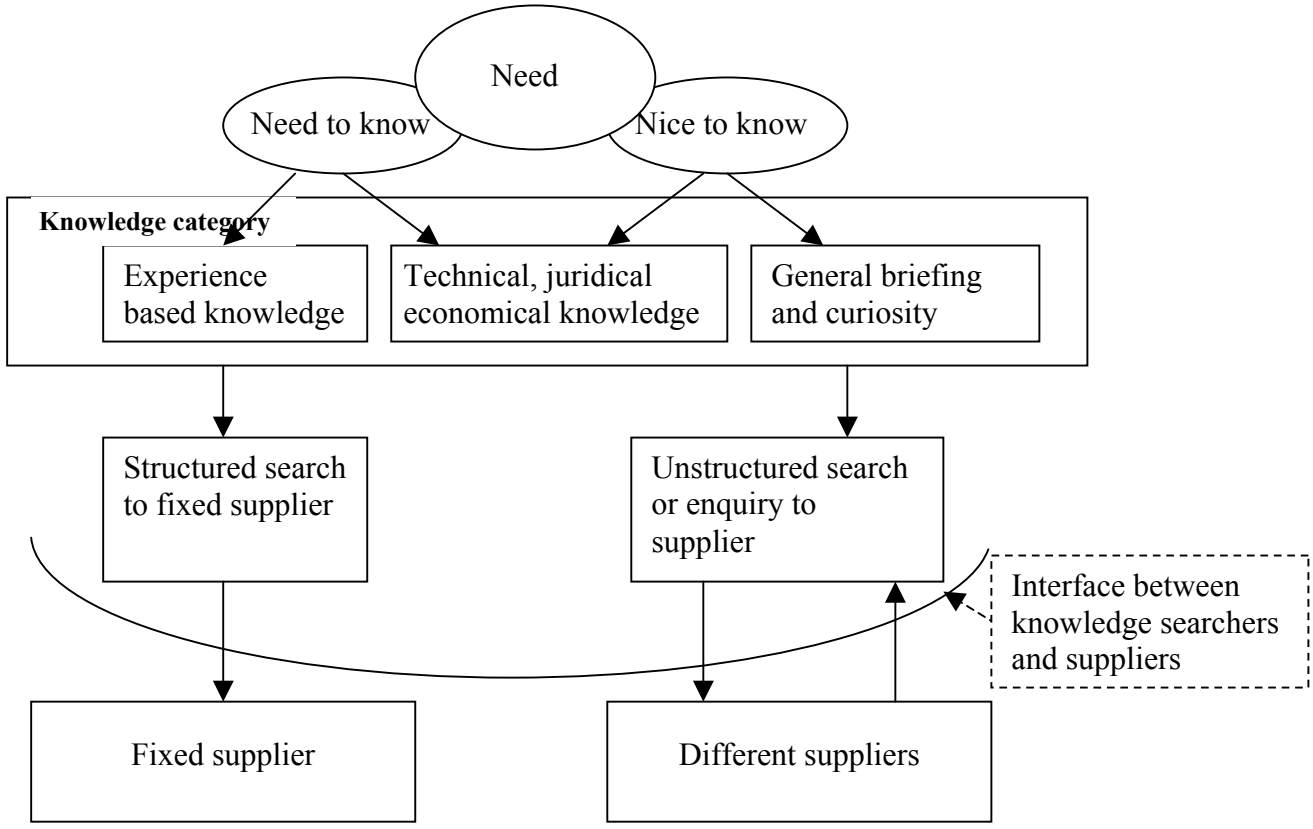
Type	Barrier
Economic and desicion making process	Energy decisions are made as a link in a political process, that not always is economically rational. Municipalities see energy saving measures as an expense, not as a economical investment. Economical incentives for energy savings are very diffuse or not existing.
Organizational	The responsibility for energy decision is given to the building management that not necessarily has energy, technical and economy skills. The link between public buildings and "town hall" is missing. Lack of political and management willingness.
Knowledge/ information	The municipality / institutions lack of knowledge on energy saving measures The theoretical effectiveness of energy saving measures appears as uncertain
Behaviour	If the physical surroundings are shabby, it can be hard to make people change their behaviour There is a prejudice that it is not possible to influence the employees/students behaviour toward low energy issues.

This means that beside the economical barriers, there are several others related to lack of attitude, lack of knowledge and institutional issues.

Further in this study we have a figure of decision process on energy matters


Decisions on energy saving solutions
Economy and steering
Incitaments structure
Decision process
Expenses culture
Decentralisation of energy costs appears as difficult and unreasonable
No connection between investments and savings.
The access to loans appears as difficult/ unattractive
Political process, priority before rationality
Energy saving solutions appears as an expense, not as an investment
Short focus
Organisation and focus
Political ownership
Formal energy responsibility
Eager person
Is not on the agenda
Discussed together with teachers salary and teaching expenses, and is therefore easily "drowned"
Does not wish / accept the energy responsibility
Lack of acceptance of time consumption.
Knowledge and information
Bases for decision
"ELO"(energy) reports
The possibility of loans doesn't show
Poor possibility for follow-up and documentation
Lack of local economical and technical knowledge
Ends up at wrong destination
Quality: low confidence to "paper- numbers"
Form: is not understandable to everyone.

2.2.2 Qualitative analyses of target groups and how do they gather information and knowledge



Knowledge suppliers

This report [2] aims to analyse the process of knowledge transfer. The report tells how different target groups get information. An important observation is the difference between why they are searching for information, see the figure above. There is a difference between searching for information needed in a project, and information searched basically because of interest or curiosity. Structured search are often performed by using fixed information supplier. It is therefore important to identify the main information suppliers and investigate if they can be used as information channels.

It is important to note that the habit for information searching is very much influenced by the habits learnt as students. It could be relevant then, to also inform students about low energy and renewable energy solutions and what sources would be reliable for gathering this information.

2.2.3 The use of information

According to the Norwegian report on strategic information [2], there are 5 elements the government can use to stimulate the lower energy consumptions in buildings; more recycling etc.

- Political – including legal and institutional regulations
- Technological
- Economical
- Cultural/ organizational
- Information

- **Political including legal incentives for energy savings:**
  The government can use laws, directives etc. that can force change of behaviour.
  The BRITA-project does not relate to policies and regulations, but we can refer to laws, directives, standards and regulations and remind the decision makers what that means to their project. Examples are:
  - The new Energy directive (2006), and its implementations to standards and regulations. It doesn't require use of innovative measures, but impacts on energy use.
  - Kyoto agreement and the EU Allowances Trading System.
  - National technical regulations or standards will be influenced by the energy directive. Few, if any, regulations require the use of innovative measures, The regulations can however require up to date measures when retrofitting, which can give a good improvement for an old building.

  Of course information to the politicians about low energy solutions also can indirectly influence to use these solutions more often.

- **Economical:**
  The government can give economical incentives like loans, grants etc. Economical incentives can influence the decision maker to choose low energy solutions. This project has a separate study in WP1 (D7) We know there are several helpful incitements for choosing energy friendly alternatives, like for instance special loans, subsidy and of course energy saving. We also know that the investment costs can be a challenge. Giving information and/or and overview of these kind of incentives is a priority.

- **Technological**
  The technologies to make energy friendly solutions are available. The challenge is to get the solutions known, attractive and stimulate their use .These solutions may have to be made easier to use, more reliable and cheaper to be widely used in the marked, but that is mainly in the hands of the industry. Some of them are not standard solutions, and there might be some risks for extra costs or unpredictable commissioning problems. Monitoring is important to show the effectiveness of different low energy strategies, of different incentives for low energy use and the saving potentials.

- **Cultural/ organizational**
  It is the responsibility of local governments to establish organizations, networks to develop a culture of low energy solutions, to train its Human Resources capabilities to implement top-down actions, etc. During the course of the project, it will be used existing networks to make them more deliberate on using the solutions we are promoting.

- **Information**
  Laws, directives and economical incentives are stronger instruments for than information to obtain reactions. However lack of information is perceived as the strongest barrier for government. During the course of the project information will be disseminated on economical incentives, legal and regulatory incentives as well as any other information that could be valuable for the decision maker.

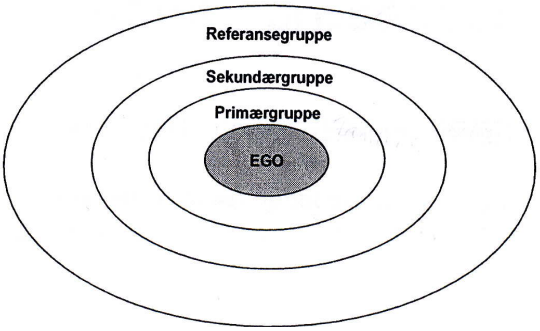
2.2.4 Kotler (market theory)

To overcome the barriers on why the solutions are not chosen, the marked theories specify three steps:

- The decision maker have to know about the solution (attention and knowledge)
- The solution must be wanted (attractive, selling arguments)
- The decision maker must be able to make it happen (economy)

Looking into the knowledge of buyer behaviour from marketing we get some help to understand how we can influence on the decision. When there is a need for retrofitting in a building, the decision maker (the building owner, technical staff or who it might be) or "buyer" goes into a "buying process". The natural questions to answer are: what kind of renovation is needed, what technologies can be used, what are the options available etc. The person will then search for information on possible alternatives, evaluate the alternatives and make a choice.

The first critical step is where the search for information starts. The crucial issue is to put low energy solutions in the decision makers' mind and make them easy to find.



The evaluation phase is often influenced by what the reference group thinks. The primary group is often family and friends, or colleagues in the office. Then the secondary group can be other colleagues in the municipality or neighbour municipality, consultants etc. Then there is the influence by the general belief in the business sector and country, for instance politicians.
This means that not only the decision makers have to be influenced, but also their reference groups.

Then, there is the influence by the market itself; types of products available, prices and promotions. When action on behalf of the municipality etc, the decision maker is also influenced by other factors:

Environmental:

- level of demand for the solution in the municipality, the region or the country
- economical outlook (at the company/municipality level)
- political and regulatory developments (do they have to do it?)
- Social responsibility concerns (are there more environmental friendly alternatives?)

Organisational:

- policies in the municipality, for instants to use low energy solutions
- objectives, for instances the project should use not more than 100kWh/m^2

Interpersonal: (influence from other colleagues)

- Is there an interest for this kind of solutions among the colleagues?
- Does the person who makes the information search and proposal for a solution have the authority to make the decision?
- Status among colleagues/network (Does choices of this kind of solutions provide the decision maker status, acceptance or goodwill?)

Individual:

- age (experience)
- education (knowledge, understanding etc)
- risk attitude (Is he/she willing to take the risk of choosing not the standard solution that may cause extra work and expenses?)

2.2.5 Building process schemes

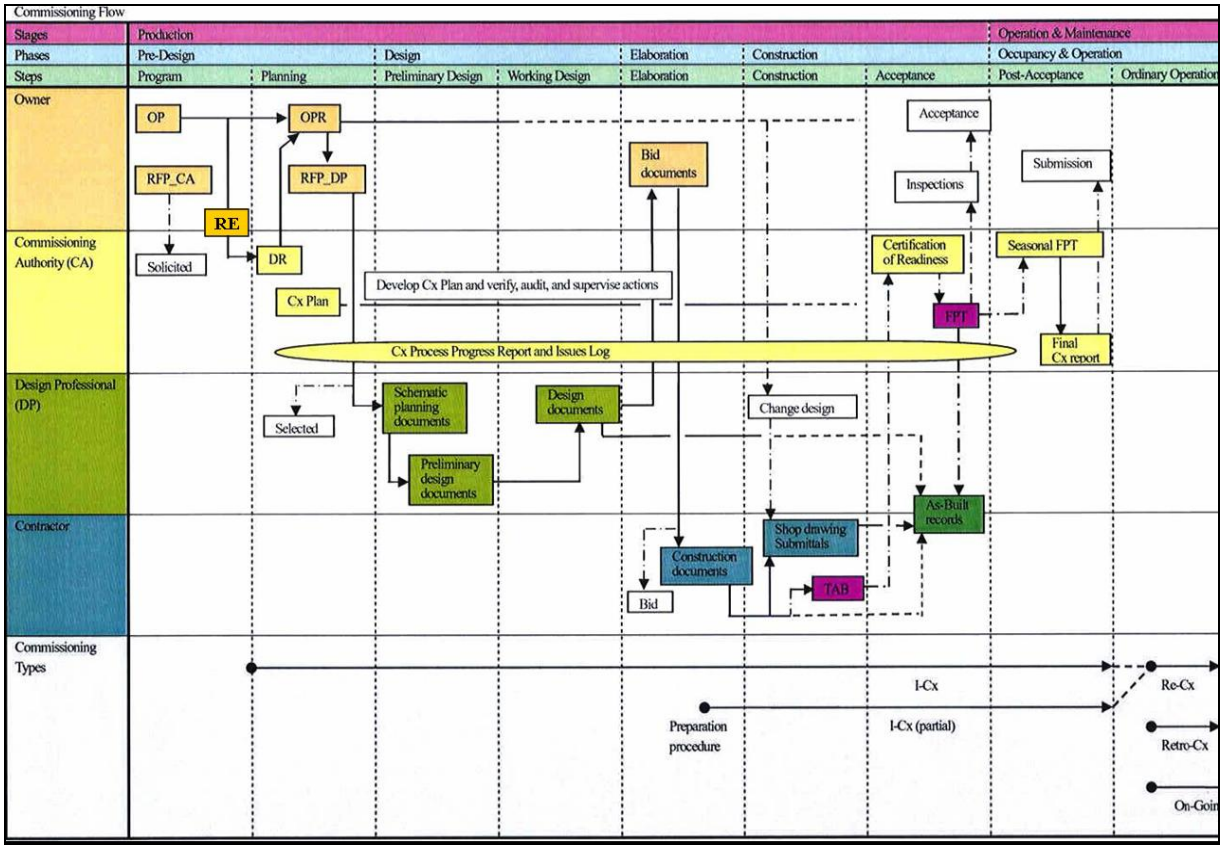
Understanding the building process and the role of the persons involved is important, as well as the knowledge of to whom information has to be released at the right time. The review resulted in several schemes with variable level of details.

According to the schemes developed in the Norwegian report [6], the responsibilities in the building process vary with the kind of contract model. Anyhow it is the owner who gives inputs like demands and "wishes" to the project, but the real decision maker can for example be the consultant.

The HQE^2R report [6] has a good overview of the process for developing sustainable buildings and shows its key actors, but the overview is not directly transferable. The main lesson from this report is that the early pre-project phase is the goal setting phase and the following pre-project phase is when strategies are developed.

The Stanford report [8] also gives a schematic overview of building process and contains detailed information on different partners involved. But the focus is on sustainability, and the overview is not the most useful one for the purpose of this project.

The best overview is given in the report from the IEA annex 40 [7]. This report shows the different phases of the project, who are involved in the different phases and their roles and responsibilities as well as activities. This overview is given in the figure below.



Often the design phase is regarded as the time when the decisions about using innovative low energy solutions are made. From the figure we see that the early phase of the project is also important. The owner is in contact with the commission authority and partly with the professional designers as they make their first plans. The schematic planning documents and preliminary design documents are made by the professional designers in the preliminary design phase.

*) Explanations

OP	Owner's Program
DR	Design Requirements
OPR	Owner's project requirements. After the Pre-Design Phase, OP and the DR can be filed together as the OPR.
RFP	Request for Proposal. Written by the owner to solicit a Commissioning Authority (CA) or to select a Design Professional for the project. A request document for a design competition is one kind of the RFP for the Design Professional
RE	Risk Evaluation
Cx	Commissioning
I-Cx	Initial commissioning. Systematic process for installation of new systems
CA -	Commissioning Authority
DP	Design professional
TAB	Testing, Adjusting and Balancing
FTP	Functional Performance Testing

3 Main hypotheses on barriers

Based on the results of the literature review, three main hypotheses have been made. The hypotheses are the basis for developing an interview guide and/or a questionnaire:

H_1 Information barrier. Decision makers and others don't know enough about low energy innovative solutions that they are preferred in public building/refurbishment projects. The right information is not available/not present at the right time for the right people in the decision process.

H_2 Economical barriers. The economy is a main barrier. The budgets don't to allow extra costs for energy friendly solutions. Financial and other incentives are not good enough or not well known. Building developers and building owners do not know enough about innovative solutions and energy saving potentials, and fear high extra costs.

H3 Organisational and institutional barriers. Building developers and building owners are not necessarily the decision makers. The decision can be influenced from politicians or done by others like consultants. Who the decision maker is, depends on the organization in the municipality and the project.

4 Survey Design

The methodology used to design the survey was as follows: Qualitative studies were needed with the aim to get insight and knowledge to the hypotheses formulated above. This was a qualitative analysis, which means rather open questions were used, as opposed to a quantitative analysis were the answers are counted and compared analytically. Interviews were regarded more suitable than focus groups, and the interviews were done over the telephone since that was time saving.

Then, by using the results of the interviews, it was possible to develop a questionnaire. In this way, the results of the interviews could be tested on a larger audience (and hence with statistical relevance) to confirm or disprove the indications given in the interviews.

4.1 Interviews

Based on the main hypotheses shown above, BRITA in PuBs has developed an interview guide. The questions were grouped into four headings plus some general background information.

- General information
- Retrofit innovation, low energy solutions, general.
- Economy
- Organization
- Information

The full interview guideline is given in appendix A. The interview guide went through a pre-test among the research partners before it was used on the target group. Telephone interviews were chosen as they are the most cost effective solutions. If necessary, personal interviews were used. The interview guide was translated to the different languages. The interviewed person was informed up front. If asked for, the questions were sent by e-mail before the interview took place so that he/she could be prepared and ask colleagues if he/she felt unsure on some questions.

4.2 Questionnaire

The answers and conclusions from the interviews led to some more specific questions BRITA wanted to quantify by using the questionnaire. The interviews helped to find current alternative answers, and by asking a larger number of persons, a better statistical analysis could be done.

These main questions and answers were translated to the different national languages and placed on the website of the BRITA in PuBs project (www.brita-in-pubs.com). E-mails were sent out to a larger group of respondents, who are connected through city networks or other networks and type of contacts. The main questions included in the questionnaire were:

1: What would be your main reason for choosing a low energy solution?
2: What would be your main reason for not choosing a low energy solution? (why low energy solutions aren't more popular?)

3: What kind of information would you like to receive?
4: How can we best give you that information?
5: In which language?
6: Who do we target with this information? To whom should we distribute this information?

The answers to the questionnaires are reported country by country. The full questionnaire and the associated motivation e-mail are given in appendix B

4.3 Target group

The target group is the decision makers, but who are they really? It is often the building owner, but could also be consultants who provide advices/alternatives to the owners, or developers. Responsible persons in the municipalities, energy managers and technicians from different public institutions were interviewed.

Five or more persons for each country were interviewed by the research partners. To contact possible interviewees existing city networks for municipalities and building owners were approached in every country, plus building owner of the BRITA demonstration projects and other known contacts. When choosing the interviewees, the size of the municipality/organization and geographical variation within the country was taken into account.

The questionnaire was sent out to a large number of respondents, depending on the possibilities in each country. Suitable existing networks were used for finding respondents.

5 Results from interviews and questionnaires

The results from the interviews in the different countries are given below. The full versions of the interviews are given in the appendix. The results from the questionnaire are shown in the graphs below and analysed nationally question by question.

5.1 Interviews

5.1.1 Norway

Overall impressions
In Norway the interviews were done among persons at the property management department in municipalities connected to different municipality networks. As innovative energy saving and renewable technology, heat pumps seems to be the best known solution, then bio-fuel (pellets) and solar heating. Heat pumps seem to be a well known and common solution if there is a water source. There seems to be a focus on using low energy windows and good insulation in many projects, while bio fuel and solar cells are more used in project with special focus on low energy solutions or with decision makers that are especially interested in these solutions.

Some municipalities have a policy to use low energy solutions, some have no declared any policy in this direction. Cost seems to be the main reason for choosing such kind of solutions. Operating problems and/or extra costs (compared to standard solutions) and lack of knowledge are reasons for not choosing these solutions.

Information
The way of getting information seems to vary, from what comes with the post (advertisement), e-mails, magazines, consultants and conferences. The comments are that there is limited time for reading magazines, and limited budgets for seminars. It seems as if the decision-makers go and search for the special things they are interested in, either by internet or through networks/consultants.

Reported use of different media:
Internet: Start with google or similar search sites.
Magazines: Kommunalteknikk, Teknisk Ukeblad, Byggeindustrien, Bygg-aktuelt. Other magazines mentioned were Murmesteren, Rørfag, Norsk-VVS.
Seminars: They attend seminars hold by FBA, Kommunalteknikk, Teknisk forening, Teknologisk institutt, Bergen energi.

Kind of information the interviewed objects want:
They need information in a very early stage of the project. In many projects they define what energy source will be of interest/ can be used, and then search for information.
Investment costs, operating costs, and savings are important. Experiences from other municipalities/other projects are of great interest. Information on operation compared to standard solutions and why this solution is better is wanted. Also tips on what to remember and what to ask for in the buyer specification.

Who else needs the information?
Facility/ property managers (engineering department) and city managers are the main persons who need the information; particularly project leaders and their directors/managers.
Politicians, mayors and city managers need concise information (economical and environmental issues). The facility management department need more detailed information and this should be given priority. Recommendations from the government would be of big help.

Information on saving potential of innovative solutions
The facility/property managers use mainly energy statistics from their own buildings and from their energy supplier. Statistics on energy savings and energy savings potential would have been of interest to some of the interviewed persons. Some answered that they get rough numbers from similar projects in other municipalities.

Guidelines:
None of the interviewed persons knew about any guidelines for low energy solutions, but they were interested in getting guidelines. Guidelines in English seem to be ok, and solutions used in Europe and their experience are of interest. The first places mentioned to start the search was internet, to ask colleagues, consultants and networks, then Enova, Byggforsk, Grip, Holte Project and NTNU.

How to give information?
Newsletters free of charge are of interest. Links from sites as "Nasjonal rådgivingstjeneste for skolebygg", FOBE and Byggforsk were mentioned. Success criteria mentioned were easy navigation, easy to find what they are looking for, and generally in Norwegian (mentioned by one). Some mentioned that since it is often hard to find back to information when you need it ("I have heard about it, but who was it that provides this kind of information?"), regularly newsletters or good search functions are good solutions.

The challenges about being updated are due to lack of time and because, in small municipalities, there are broad areas of responsibilities and no chances to specialize in specific issues.

Economy
The impression from the interviews is that decisions are based on life cycle cost, including both investment costs and operating/maintenance costs. Pay back time is important. The politicians are very concerned about energy use, so energy saving solutions are very welcome if they save energy and thereby costs. General evaluations of different kind of solutions and their profitability and pay back time can be hard to perform since the energy prices (electricity) are changing.

The final decision is done by the politicians at the municipal council level, but the priorities are often done by the property management department. Saving costs is one of the important arguments to choose low energy solutions. One of the interviewed added enthusiastic "you have to believe in it – then it gives results".

Incentives: They all know about ENOVA (Governmental firm whose goal is to stimulate market actors and mechanisms to achieve national energy policy goals through financial instruments and incentives), but have mixed experience. Their impression is that it is hard to make the project fit to the ENOVA system, and that it is a lot of paperwork for an small

financial compensation. Those who have succeeded, stress the importance of having good and interested consultants. One of the interviewed persons even mentioned that a criteria for choosing a consultant is about his/her knowledge about incentives. The general impression is that they think it is hard to have an overview of incentives. Ways to get information is through internet, energy centres and networks or directly from those who give the incentives (ENOVA, Husbanken etc.)

Organisation:
In the end politicians are the ones who make decisions on budgets and on technologies. But in most cases, the staffs in property management department in the municipality are the ones who propose solutions and their priorities and make the budgets. Some municipalities have an overall strategy to choose low energy solutions, and from the persons interviewed heat pump and district heating are two solutions most often chosen.

The property management department often hires consultants to do evaluations of different kind of solutions. There is a network of property management departments that is used in variable degree for discussions and exchange of experience.

It is important to note that the choice of solutions are set at a very early stage of the process. As the approval of the budget is done, the main lines of the project are set.

5.1.2 Denmark

Overall impressions
The Danish interviews were made with 5 municipal decision makers, sitting at different positions in the municipalities from directly responsible for the building departments (3) to a position at the planning department and an administrative leader of a cross-cutting Agenda21 activity.

When asked what they thought of as innovative solutions the distribution of answers was as follows:

- Innovative insulation 111
- High – efficient windows 111
- Hybrid ventilation 111
- Improved day lighting 111
- Reduce of overheating, using building mass and shading (passive) 1
- Heat pumps 1
- Solar thermal collectors 111
- Passive Solar gains 1
- PV-integration 1111
- Others: zoning 1, shading from trees 1, use of rainwater in toilets 1, fuel cells 1

which shows that they were all knowledgeable about energy saving measures in general and innovative solutions in particular. They were also quite positive towards their implementation.

Three of the persons interviewed meant that they themselves were the person in their organisation who had an overview of innovative energy saving and renewable energy

technologies. Besides the answers were distributed on 2 for an Agenda 21 co-worker, 2 on persons working with the daily running and maintenance issues and finally 2 answered also that they used building consultants.

Only a couple of the interviewed persons would say that their organisations have official policies for the energy-efficient solutions, but they were generally conscious about this possibility. The choice of energy-efficient solutions is mainly based on the payback times and expected reliability. They are generally afraid of running into problems with new technologies.

Information
The interviewed persons get their information from all kind of sources: technical journals, different associations, research institutes, libraries, colleagues, internet, conferences, etc. However, professional magazines, journals had the highest score. Periodic newsletters, specific websites and search on the internet were used a lot. They were also very positive towards specific seminars (go home meetings) which are also useful for networking.

They were generally interested in energy saving potential, economy and maintenance issues. But also the aesthetic issues were mentioned as important.

Among other people in an organisation who may need other kind of knowledge they were mentioned the project leaders, for specific projects and the maintenance staff (caretakers), but also the users (e.g. teachers and employees), the technical consultants, the building contractors and the politicians.

The technical personnel need information about the energy saving potential and costs.

Most of the interviewed people were aware of and used energy statistics for comparing benchmarks, etc. Two of five also used energy reports, news magazines and referred to energy certification reports regularly.

Most of them answered that they had information about the energy saving potentials of innovative technologies. They found that it was not difficult as such to be updated on energy efficient solutions, but it is time consuming. Most commonly, they found information in subscribed magazines and on free web-sites as, for example, the Danish Building Research Institute. Two out of the five answered that a barrier for getting guidelines was the lack of knowledge about their existence.

The preferred information channels were newsletters and the internet. Several interviewees were very positive towards seminars and special product information meetings. Also articles in journals describing for example demonstration buildings were appreciated. The information topics mostly wanted are:
- saving potential (energy and cost) and
- reliability

Economy
The answers concerning the high investment cost as a barrier were subdivided in two opposite opinions. Some of the municipalities used loans for energy saving investments and therefore did not have any problem, whereas for others the loans were not used and therefore high investment costs were a problem. Another problem mentioned was the demand for extra time

and planning in relation to the standard solutions. Lifecycle and investments costs were mentioned as basic for decision making.

The only actors who can decide on using more expensive investments if they have reasonable payback time are politicians at the city council level, but technical co-workers can influence their decisions.

Three of the interviewed persons said that they knew about economical incentives for choosing innovative energy saving and renewable energy technologies, namely a soft loan from the Danish government. The other two were not aware of that.

Organisation
Each organisation has special staff for retrofit projects. The human resources vary between 5 to 15 employees. The main responsibility in the buildings owned by these municipalities lied with different organisations/persons: the technical organisation itself, and external consultant, external consultants in cooperation with one person from the department and the maintenance staff.

The most important time in the project to introduce innovative energy saving solutions is early in the planning phase or even before when the idea of the retrofit is conceived. One answer was: Anytime! – however, budget is crucial.

The responsibility for the decision to use energy saving solutions lies mainly in the department for building management within the municipalities.

The municipalities generally had political networks (i.e. networks for sustainability) but only at the political level. They would favour however networks to share technical experiences.

The type of contract used in Denmark is generally a straight forward contracting with a contractor – either what is called a total (including the architectural and engineering services) and with a main contractor.

5.1.3 Finland

Overall impressions
The number of interviews was seven. Two interviews were made in person and 5 interviews over the phone. The duration of the interview varied from 30 minutes to 1 hour 15 minutes. The respondents were managers or directors of their organizations, and all of them having long career in the business.

The interviewees represented 4 bigger cities, population > 30 000 and 3 real estate companies, of which one was a business park. The technical personnel in the cities are working according to the plans and boundary conditions accepted by the political decision makers, usually after interactive negotiations. City government and city council will make the budget decisions, according to the proposal (more or less) of the Board of Real Estates. Under its control there is an organization, nowadays very often public utility-like, which takes care of facility management. In the communities, generally in big cities, the organizations are splitted into

producer (construction) and ordered (client) units. Real estate companies have more freedom in relation to the economical framework and customer demands.

In general, communities do not begin their retrofits and repairs only based on energy related reasons. The reasons for retrofitting and renovations are very often due to change of use or complain by the users. Complains are addressed usually to unsatisfactory indoor air quality or thermal comfort – in general indoor air conditions, and with less extent related to moisture damages and mold. These last two categories are partially depending on each other – in case of insufficient ventilation and construction defects. Cities have normally short-term and long-term plan for renovations and a priority list. These plans are based on condition surveys and energy audits, which are done relatively systematically, and also users' needs. But in all possible cases they use the various support schemes for energy conservation, if possible. The main schemes are: MOTIVA-support (from Ministry of Environment) for energy audits, ESCO-contracts and energy saving contracts.

Almost all the buildings under control of the interviewees are being monitored. In some cases the monitoring and analysis of the results is done by consultant. Some cities have also management software in use, but in general, the interpretation and processing of the monitoring results is done by the own technical staff of the organization. Electronic operation and maintenance manuals are in use in some, mainly new, buildings. All the buildings must have operation and maintenance manual, mostly in paper form.

The heating is based on district heating. Electronic marketplace was liberalized in the mid 90`s. After that it has been possible to have electricity under competition. The representative of real estate companies highlighted this fact:

"The essential thing is how to purchase the energy, energy negotiations, how to buy it. Money is always the final prize. Sometimes we can get off 20 % of the price in these negotiations. However, a similar saving by technical innovations and improvements is very difficult to achieve, mainly in cases where the initial output level (starting point) is not so high."

Almost all respondents emphasized the significance of low energy measures which do not need investments or just relatively minor investments like:

1. Monitoring and benchmarking the building stock
   - this is the base for all energy saving measures and also for energy audits
2. The optimization of running time of ventilation systems
   - this has been the most effective energy saving operation but it includes also some risks
3. The proper use of existing systems and installations in general (like balancing of the heating system)
   - many respondents stressed the proper use of building services – we must first tune our system to its best level and the look if the performance level is within the demands
   - the utilization of free heating
4. The training and motivation of personnel
   - the personnel is in the key role – misconceived attitudes and inappropriate working reflects also to the energy related topics

Thee most used energy saving measures were:

- improving heat recovery of ventilation
- ventilation repairs in general

- change of windows and blocking the leaks of exterior walls
- additional insulation in some cases
- renewing of water fittings
- renewing of lamps

These measures mentioned above are conventional ones, widely used in retrofitting. The line between innovative energy solutions and conventional measures is difficult to draw. There is some suspicion of novelties and innovations, and energy related matters are not the only ones that concern the building owners.

"The best improvements are those that make things easier for service personnel; it is difficult to decrease the proper energy consumption more than 2 – 3 %, so that the price is most essential in terms of savings because we can immediately see these savings as money"

Almost all organizations had used some new or innovative technologies in particular projects:

- new very precise water meters
- electric glazing, low U-value windows
- air heat pumps
- free cooling with natural outdoor air (wintertime)
- stepwise operation hours of equipment
- savings by adjustments of building automation
- smart heating and ventilation systems
- the reclamation of condensation heat from refrigerating machines in preheating of incoming air supply
- decentralized ventilation installations
- district cooling systems

On the other hand, all the respondents agreed that they must follow the technical progress – but “unfruitful berries” are not needed.

Information

The general concept seems to be, based on the interviews that the organizations rely mostly on reference buildings and best practices in technical solutions. Every organization has its own network where they can get information. Consultants are also used, particularly when they are in continuous co-operation with the organizations. The information of manufacturers was widely used, but some of the interviewees saw some restraints in dealing with that information.

The representatives of real estate companies brought out, that they must have own skilled experts. It is the base for profitable business. “From the point of view of real estate investment company the question is: How to choose the proper information – the main line of business is to own and develop properties, which means that the organization must have professionals who will make choices based on proper information sources. The use of the building will also determine the solutions. In retrofitting there are many simple ways to gain savings.” This opinion came forward also during the interview to representatives of the public sector.

Information was searched using all other channels as well. The main sources of information varied accordingly to the respondents, but research institutes, journals, conferences and courses were mostly used as source of information. Internet seems to rise along the side of libraries, even passed them. The main general source of energy conservation related topics

was MOTIVA – The Energy Saving Center. Also the available statistics – The Association of Communities and Regions and other producers – were very well known.

The usual comment was that there is enough information available and the sources are familiar. Some respondents wished, anyhow, one-door service for energy saving information and especially information about public support opportunities. Probably the problem of availability of information is more crucial for small towns and communities and small enterprises. In many cases the main barrier is of lack of resources. In a small community one person, usually a building master or building engineer has responsibilities aver all the building stock, among many other duties.

There could be problems in the information transfer inside organizations. In one city Real Estate Services Center has organized working groups over the administrative borders, including representative of users, contractors and other partners: "The Real Estate Services has created different expert groups, including experts from different units and also from outside (contractors, consultants etc.). These groups (indoor air quality group and building automation group) work as a discussion forum and information exchange platform. They do interdisciplinary cooperation over different divisions of the administration. An example of the results: Moisture and healthy problems in buildings - rating list for the order of importance and priority order for renovations".

There was one practical suggestion to improve the illustration of effects of energy savings:
"One recommended way to visualize and illustrate the goals …… could be animated software in which one can see

- The display and scene from the rooms
- Illustrated air flows and temperatures
- The effect of various factors: How the changes in parameters will effect to IAQ, thermal comfort

To this presentation should be added:

- How the running costs are changing if the settings are changing
- How the quality parameters are changing if the settings are changing
- How the different factors affects to the level of rent (i.e. how the changes affects to the costs
- distribution)
- How the change of quality level affects to the level of rent
- How these changes affect to LCC (lifecycle
- costs)

So, for the building owner is very important, that one could show to the customer how different factors affect the final result and to the level of rent. The confirmation of technical evaluations and economical calculations would give good information to the customer. If the software package could be run in a PC the building owner could easily demonstrate it to the customer. This kind of product would be very useful"

Economy
All the interviewees said that the full costs – generally expressing life-cycle-costs - should be the base for investments. In practice, there may be some boundary conditions. In the communities the investments costs can play important role in some decisions. The technical personnel have a budget framework to work within. If the solutions do not exceed the budget

limitations, usually the decisions will be made according to their suggestions. In some cases the investment costs must be taken into account, because of budget limitations.

Some interviewees said that the use of public support is low in their cases (enterprises). There were also doubts, that small communities can not use these forms of governmental support because of dispersed information.

Organisation
There are energy saving experts in the community organizations, and usually these public utility-type organizations uses also the services of consultants. The communities have also personnel in charge of renovation and retrofitting. The problems may be worse in small towns and communities. The choosing of the solutions is based energy efficiency and life-cycle-costs, in general. The procedure will be made mainly inside the organization, using also consultants and other partners.

The decision about the energy solutions must be done in early stage, in pre-design stage in general. After that, everything is fixed. The responsibility for retrofitting projects belongs mainly to technical staff in the municipality. The designing job could be given to consultants and in ESCO-cases to an ESCO-.contractor, but in co-operation with technical staff. The situation in real estate companies is very simple. The company has the main responsibility.

Summary and conclusions
The main conclusion is that just in few cases the reason for retrofitting is taken only on energy saving grounds. Energy savings will be reached when indoor conditions are improved or damages have been repaired. The starting point is to take over the buildings by continuous monitoring and benchmarking. Based on the results, the technical staff can make the program for condition surveys and energy audits. Based on these measures they can plan the short-term and long-term program and priorize the needed actions. The use of building automation system should be improved – nowadays there seems to be gap between the users and the possibilities of the systems. On the other hand, the systems could be developed more user-friendly, taking into account the needs of building owner/user.

The first stage for energy saving is the proper use of the buildings – in many cases good results can be achieved with zero investments. The role of technical staff is very important which means continuous training in some form is needed. There is lot of information available, but “one-door-service” would be needed. Internet will give good opportunities for that. The working groups inside the organizations can see the barriers and improve mutual understanding.

The organization model of facility management in the municipalities has been changes during the last years. The return requirements can cause some conflicts between building owners and users. By using PC-models and software it would be easier to illustrate how the change of parameters affects the building characteristics and its running costs. The decision making is more and more based on full costs, i.e. life-cycle-costs. The life-cycle-costs procedure should be introduced to all the parties involved in the energy related decisions.

5.1.4 Germany

Overall impressions

The German interviews were made with 4 decision makers, two of them in different administrations of a medium to big city, the third responsible for the energy-related design of governmental buildings and the last is a project director for performance contracting of a big construction company. All of them were interested to receive information on innovative energy saving technologies and renewable energy implementation.

Three of the interviewed persons focus on the HVAC-system as innovative solutions for retrofit (heat pumps, absorption chillers, solar collectors, etc.), building envelope solutions like high-efficient windows, innovative insulation, etc. were less mentioned, with the exemption of double skin facades. In terms of the windows the reason might be that the standard window used in Germany today is a high-efficient window with U-values of around 1,3 W/m²K. So an innovative solution would for most of them imply an even better window that means triple-glazing or insulated frame constructions.

However one of them grouped the order for the solutions as follows:

1. Measures to reduce the consumption (insulation, reduction of technical equipment such as lighting and ventilation)
2. High-efficient technology (ventilation with heat recovery, lighting)
3. Renewable energy technologies (wood as fuel, solar/thermal, PV, heat pumps).

In any of the concerned organisations there are colleagues who have an overview on the innovative energy savings solution possibilities. That could be of course influenced by the choice of interviewed people that have worked together with the interviewer organisation in energy-efficient projects. All organisations have policies for the energy-efficient solutions, partly as so-called energy decrees or guidelines for sustainability. The choice of energy-efficient solutions is based on the life-time costs and the economical efficiency of the solution. Reliability is also an important item.

Information

The interviewed persons get their information from all kind of sources: technical journals, different associations, research institutes, libraries, colleagues, internet, conferences, etc. A focus on one or two of the sources for providing information out of the BRITA in PuBs project can not be done based on the results.

The preferred type of information is:
- general information -> new technologies
- saving potential (energy and cost)
- reliability

In the question prioritise the information needed, the ranking was:
1 cost (benefit, economy = investments, savings, maintenance)
2 knowledge of possibilities
3 energy saving potential
Additionally sketches and design were prioritized in one case.

The assessment of who to give information was answered differently: the project leaders were favoured by most answers, the building owners and the technical support staff in the building

got a high priority, too. One answer indicated that the information content or level has to be adapted to the different groups.

Guidelines on innovative energy saving and renewable energy technologies are used; some of the administrations even produce their own guidelines (see energy decree or guideline for sustainability). As problem for obtaining additional information incl. additional guidelines, all interviewed persons referred to limited time.

Economy
Most of the answers show that life-time costs are the basis of the decisions, yet one answer points out that because of focusing on investment costs, the implementation of energy saving solutions is problematic as the savings will show up in a different budget. Since projects have to be accepted by the city councils there is also a limit for the investment costs, so sometimes a bit more expensive energy-efficient measures are cancelled even if the life-time costs show that they are economy-efficient. In cities the decisions are split between first political (city council) and second technical (planning departments).

Most incentives can't be used for the governmental buildings and only partly for the buildings of the cities. Third party financing model (TPF) are offered by one of the interviewed persons organisation, the cities have many problems with those and partly started a self-financed internal contracting. However the interviewed persons seem to have a good overview on possible incentives.

Organisation
Each organisation has special staff for retrofit projects. The amount of people differs between 10 to 70 employees. The main responsibility for the public owned buildings (cities + state) lies within the administration (financially and planning + realisation in different departments). In the case of the private company the responsibility is in the acquisition phase at the TPF-department (Third party financing), in the realisation phase at the planning department and later on at the facility management department.

The most important time in the project to introduce innovative energy saving solutions, etc. is for most of the interviewed persons the very first planning phase or even better when the idea of the retrofit starts to exist. Additional input is needed in the planning phase, but decisions on the integration of innovative systems are made very early.

The responsibility for the choice of energy friendly solutions is either at the cities department for environmental protection or in the other cases the project manager and/or the building owner.

Depending on the organisation the interviewed person works for, there are several networks like "Städtetag", "CEMR" and "Energie Cites". The person from the government didn't know of any suitable network, the private company person pointed on cooperation with research institutes and finance experts.

The type of contract depends on the project. For public owned buildings there are mainly VOF contracts in case of competitions and VOB/VOL[1] contracts for all other projects. The decision maker from the private company said, that they use different kinds of contract depending on the need of the client.

[1)] VOB is the short form for Vergabe- und Vertragsordnung für Bauleistungen

VOL is the short form for Verdingungsordnung für Leistungen
These two regulations define the procedures of awarding of the contract for constructions of buildings and the terms and conditions of contracts between the building owner and the construction company but in two different situations. For private building owners they are voluntary, yet public building owners are obliged to use the respective regulation.

5.1.5 United Kingdom

Overall impressions
The UK interviews were made with 5 persons. A site manager, a senior research in buildings, a building administrator, a occupant and a developer. All of them were interested to receive information on innovative energy saving technologies and renewable energy implementation.

The barriers to energy efficiency and renewable energy use in buildings are well understood and documented. These barriers are perpetuated by a system which provides a disincentive to energy efficiency and embedded generation with renewables and by an information asymmetry which ensures energy users are unlikely to invest in profitable energy efficiency and renewable energies and engage in socially optimal energy conservation. The main factor could be the fact that externalities are not reflected in the price of the energy. Energy consumption produces negative externalities, pollution inflicted on society, the environment, climate change; which is not reflected in the price of energy. These externalities distort the real price for energy which along with tariff structures which encourage consumption contributes to impeding energy efficiency and embedded generation.

Information Barrier
Provision of information and advice is an essential tool for overcoming barriers to energy efficient investment, and realising the full potential of the policy mix. There is a large area of where guidance is needed by business and by consumers – both at practical level, and to facilitate the intake of innovative energy efficient measures and embedded renewable energies in the building environment.

In the UK, there are two sources of information, which are the web sites of the Carbon Trust (www.thecarbontrust.co.uk) and the one of the Energy Saving Trust (www.est.org.uk)[1]. Targeted advice, whether to individual householders by the EST's Energy Efficiency Advice Centres, or to individual companies via Carbon Trust's Action Energy programme, can help overcome many of the non-financial barriers which currently stop action being taken.

Apart from these two sources, the other main sources of information are advertisement and technical magazines. However the kind of information received in magazines is limited to just advertisement or very technical material. There us a big gap between these two opposite extremes of the spectrum. It is needed non-technical information and mainly information on financial issues and economic incentives. However, the main barrier regarding the search for

[1] Government and the Devolved Administrations provide funding for the Energy Saving Trust and the Carbon Trust to stimulate the uptake of energy efficiency in homes, business and the public sector. The **Energy Saving Trust** (EST) works in partnership with manufacturers, retailers, installers, energy suppliers, local authorities, advice providers and others. EST seeks to ensure the most effective delivery of energy efficiency to homes and small businesses for consumers, the 'Energy Efficiency' branding and marketing programme aims to transform attitudes to energy efficiency.
The **Carbon Trust**, launched in April 2001, is developing and implementing programs to accelerate the take-up of energy efficiency in the non-domestic sector. These include the 'Action Energy' information and advice service; an interest-free loan scheme for small businesses; and stimulating innovation in new low-carbon technologies.

information seems to be the difficulty to be guided through the search engines, to organise the knowledge that is already available.

The general perception is that the actors that should be the target with an information campaign are building owners, developers and site managers since they are the ones that make the decision regarding retrofitting and technology choices. Regarding more technical information like guidelines, it seems that there is a lot of confusion about how to get them and how to use them. As we mentioned before, in the UK, there exist two very good sources of information regarding guidelines, however their target and their contracts have to be revised to match decision makers and building owner's needs.

Financial barriers
Among professionals there is a widely held view that the financial costs associated with the high investment cost in the first year, with financial savings only in the following years cannot be recouped in investment yields.

There is no culture to analyse the total lifecycle costs as a basis for the decision process and the present scenario of financial indicators does not help to change that culture.
There is lack of information regarding financial incentives for choosing innovative energy saving and renewable energy technologies

The interviewees were in favour of financial incentives, they felt that the UK government should take the lead in creating financial incentives for greening the property industry. Financial support, e.g. in the form of Carbon Trust's small business loan scheme are expected to generate substantially increased uptake of energy efficiency measures. However, unless these incentives are widely disseminated it is doubtful that they would have a marked effect on new and existing buildings given the barriers discussed above.

Well-designed financial incentives (or disincentives) can achieve high leverage in situations where there is a relatively small price difference between the energy efficient choice and the standard option. Bridging the gap with a subsidy (or a charge on the inefficient alternative) could induce a significant behavioural response, provided that the market is restrained from absorbing the subsidy or charge within an adjusted price structure.

Organisation focus and the decision maker
Problems begin at the design stage, with clients rarely demanding energy efficient buildings, and architects rarely forcing it on to the agenda (this may improve now that sustainability considerations are a requirement in all British architecture degree course design projects). Architects, surveyors and letting agents all have a financial interest in upping the specifications of buildings, since their commission reflects total cost. Environmental engineers are then called in to design building services to overcome the effects of inappropriate building design. The result may be an inefficient, uncomfortable and unhealthy building, but this will not necessarily be reflected in a lowered valuation if it is otherwise of 'investment quality'. Indeed, the opposite situation is more likely: when confronted with a non-standard product (such as a highly energy-efficient building), UK valuers actively mark prices down. Conservatism and vested interests across the property professions inhibit provision of the kinds of workplaces occupiers actually want.

So why do occupiers not press for change? Low energy bills as a proportion of overall turnover, lack of information on energy costs and non-ownership of buildings appear to be the main barriers. One commonly cited reason for the lack of investment in energy efficiency in

buildings is that energy represents a small percentage of total occupancy costs, and therefore it is given little attention. However, in offices this is not the case. It may be that tenants are not aware of the energy component of their service charge, but energy (and A/C) comprises a significant proportion.

5.1.6 Italy

Overall impressions
In Italy the interviews were done among different kinds of persons (a mayor of a small town, two energy managers, an executive "Property and Logistics", and a technician from a different public institution).

About innovative energy saving and renewable technology, there is a quite good knowledge of the several different solutions. But, certainly, the focus seems to be on the serious problem of good management and monitoring: reorganization and make more efficient use of the technologies currently available, adoption of advanced management and monitoring solutions. Generally there isn't a declared policy for low energy solutions; the use of this kind of solutions is often addressed only to the more representative buildings. That is, image seems to be the main reason for choosing these kinds of solutions.

Extra costs (for the investment and also, particularly, for the project) and poor environmental sensitivity are the main reasons for not choosing these solutions in a broader context.
Moreover, decision makers change too frequently so they prefer to achieve immediate results instead of long-term and better results.

Information
The preferred way of getting information seems to be through internet, magazine, conferences and consultants. Saving potential and economical aid is the most required information. However, the available information is too vague and imprecise. Project leader and technical staff need technical and costs information. It is also required a widespread basic information to all the people, starting from administrators to technicians as well as end users.

Generally, they don't use energy statistics or energy reports, neither guidelines but they are interested in getting ones. They would find more useful information mainly on the internet.

Economy
The impression from the interviews is that decisions should be based on Life cycle Cost but, generally, are based on the investment costs. Both politicians and external project leaders are not very concerned about energy use, so energy saving solutions is not widely adopted. The final decision is done by the politicians, but the suggestions have to be made by project leaders. Saving costs would be one of the important arguments to choose this kind of solutions. Some of them know about incentives (generally from internet but also from internal energy managers, colleagues and bulletins).

Organisation
At the end politicians are the ones who do the decision on budgets and what technologies to use. But in most cases, external project leaders and technical staff are those who propose the solutions; politicians and property managers decide the priorities based on budget availability. For all of them the most important time/phase for discussing energy saving solutions is the preliminary phase of the project. The contracts currently used do not facilitate the use of innovative energy saving solutions. Only the big organizations have a network for information and experiences exchange.

5.1.7 Greece

Overall impressions
The interviewees from Greece represent different points of view in the spectrum of low energy retrofitting of public buildings: some come from the public building technical sector, others from the low energy contractor/researcher sector while others represent the point of view of the director/user of a public building to be retrofitted. They all share good background knowledge of alternative energy technologies in buildings, but public sector engineers have a rather limited knowledge of innovative solutions.

The main problem with introducing innovative low energy system in public buildings seems to be twofold:

1) Mainstream public building engineers and technicians who usually do the planning and design of public buildings, either new or retrofit, don't have enough knowledge to include innovative low energy solutions in the pre-planning and study phase of the projects they are responsible for.
2) There is also very little knowledge of problems with operation and maintenance of low energy systems. So that technical staff in charge cannot assure good standards of operation.

Therefore if no additional financial incentive is offered, there is no possibility for such systems to be decided for in the planning phase.

In case of special projects (f.ex. pilot projects, partially funded by the E.U.) it is still difficult and time-consuming to implement innovative systems within each building because of legislative barriers, since laws for public buildings are usually based on open "calls for tender" procedures, which make it extremely difficult for specialized studies to be included and implemented.

Unfortunately although there exist several innovative low-energy pilot projects in the public sector, some of them in retrofitting, there is very little dissemination of experience (monitoring results, problems with operation and maintenance, operation and construction details etc) stemming from these projects – and this is very important aspect which could help create the "dynamics" of a change in attitude among decision-makers and technicians.

Information
Information is mostly sought through the Internet (specialized web-sites) and technical publications, conferences and consultants, and would be most useful if available in the preliminary phases of a project (planning, design).

Information needed would be mostly in saving potential, construction details and calculation tools as well as financial incentives if available, and it should be advanced mostly to the technical, but also to the administrative staff and the users.

Energy statistics and reports are seldom used, and so are energy design guidelines. More detailed information applied to specific buildings (case-studies) is needed. This would serve as a pool of specific examples that can be followed, if design and construction details are provided in an explicit form so that they can easily be "transferred" to other projects.

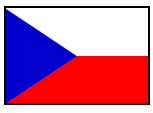
Economy
Investment costs are always used as a basis for the planning phase of a project, as saving returns are difficult to pinpoint and take advantage of, because of the fact that energy bills for public buildings are often paid directly by the state –so there is no direct advantage in energy conservation measures for the building administration or the users in teems of an energy saving bonus for instance.

Innovative low-energy systems have been implemented mostly in pilot buildings in the public sector, where specialized studies have been assured by consultants and extra investment cost has been financed by an extra source. The problem is that these examples cannot be repeated in mainstream projects since both cost and legislation present very important barriers in their implementation.
(E.U. Ministry of Energy and Development etc.)

Organisation
Building retrofit projects are considered mainstream projects, so they don't occupy a specialized service in most public organizations. In case of innovative energy technologies integration, the decision should be mostly political, and the technical support needed should be available early in the planning phase and mostly from specialized consultants.

Existing contracts are based on open calls for tenders procedures, which do not facilitate the inclusion of innovative systems. A special selection procedure can be used if a committee responsible for judging specialized contractors can be set up.

5.1.8 Czech Republic



Overall impressions
In the Czech Republic, interviews have been performed with people from municipalities (heads of investment departments of several large cities, mayors of a small city having no specially oriented investment department, heads of departments responsible for energy policy).

Results of interviews show that experts from energy departments indicate as low energy solutions almost all measures because they are well informed. People that have rather higher positions (mayors) but don't have an engineering education, have rather limited information. They indicate only some measures that are probably more publicized:

- Innovative insulation (but it is not always clear what they exactly understand by innovative insulation). Some of them just understand an improved insulation using a better material of a classical origin (e.g. rockwool) or thicker insulation.
- High efficient windows

Heat pumps are among the known technological measures but due to lack of water resources in most of dwellings, only HP air/air or air/water are thought about and only for transient annual seasons autumn and spring. Almost all interviewees said that the main limits for not using energy saving measures are investment costs. Most of so far measures include just a new insulation of building envelopes even without solving in any way the ventilation problem. There are very few examples of a retrofit that would use sophisticated energy saving measures. It seems that sufficient information is available and that people know about low energy measures but very often such measures are "a priori" considered to be too expensive and lower operation costs is not a good argument for choosing them.

Information

Energy and investment experts mentioned that almost all information sources we know about; often adding some new measures like using building mass to reduce overheating or absorption cooling. These experts very often are able to use advanced internet search machines like Google. People that are in rather higher positions (and maybe with more general responsibility) often don't know about Google. In this context we have to emphasise that in the Czech Republic there is a well-known website called TZB-info that publishes very interesting articles about everything that is connected with buildings, their systems and low energy measures. But this site is still not generally known among municipal authorities. This fact is confirmed by visiting discussion group at the site. It can be found out very quickly that the names of discussing people are repeated, what of course doesn't necessarily mean that only these people visit the site.

There are also specialised magazines like "Ventilation, heating and installation", or "Klimatisation", with special issues on low energy buildings, "Interier" or "Architect" where many articles are published on energy saving measures. But it seems that there is no systematic education of municipal authorities on low energy construction and retrofit. These people very rarely use Google because of the English language. There are seminars organised on specially chosen topics, often organised by companies advertising their products (HP, heating systems, boilers, recuperators etc), but only architects and designers attend these seminars. Municipal authorities claim that they don't have time to spend on seminars and sometime they lack funds to attend seminars.

If they need information, they rely on project managers (architects, engineers responsible for the design etc.). The most relevant information about a new construction or retrofit is the cost and financial resources. Beside information from public sources, there is in the Czech Republic a network called EKIS supported by the Czech energy agency where people can find relevant information about all low energy measures and sustainable construction. In all municipalities, specialised departments have available energy audits of all public buildings and also programs focusing on energy savings and alternative energy resources that are part of the "municipal energy concept".

Economy

Decisions about energy savings measures are based almost solely on investment costs. Life cycle hasn't been a prioritized concern so far. The basic problem is the budget. Cities miss more elaborated system of subsidies from Regions, state and EU, a wider system of bank loans etc.

In case of more expensive investments, political decision must be taken. For small investments, there is a National program on energy efficiency and renewable energy sources that has very limited resources and very strict conditions to fulfil.

Organisation
In most of municipal governments there are boards called city energy management whose members are people from the Town council and representatives of organizations that operate city buildings. The main responsibility for the retrofit project lies on the heads of the appropriate town council departments and the directors of the buildings that are to be retrofitted. The most important phase in the project is the initial design phase. The main responsibility in choosing energy friendly solution lies on the investor and energy auditor. All these people have access to various information and consultancy networks (EKIS CEA, SEVEn, Energy commission of the Czech union of cities and villages).

5.1.9 Lithuania

Overall impression
In Lithuania the interviews were done among persons at the different construction companies and organizations. As innovative energy savings and renewable energy technology, high-efficient windows are the best known solution, then solar heating and hybrid ventilation.

Some organisations have a policy for applying low energy solutions, some use more standardised solutions. If companies apply low energy solutions, they choose usage of efficient windows, insulation or hybrid ventilation. Cost and requirements of European standards seems to be the main reason for choosing such kind of solutions.

Information
The way of getting information:
Organisations hear normally about innovative saving and renewable energy on seminars, special courses, and internet. When looking for information they search on internet with Google or in special web-sites, in magazines, associations or different courses or they ask for information to friends and colleagues.

The sources of information are:
Internet with google. Magazines: Environmental Research, Engineering and Management, Energetic, Ecology, Science and Life, House and People, Namas.
Seminars: they attend seminars organized by LTMA (The Academy of Applied sciences of Lithuania), KTU Institute of environmental Engineering, VGTU Civil Engineering and Environment Faculties, Lithuanian Energy Institute.

Kind of wanted information:
They need general information on technologies; they are also interested in economical incentives, qualitative and technical characteristics.

Who else needs information?
Project managers and technical staff in organization need information. The most important recipients of information are technical staff, project managers and the building owner. Technical Consultants are mentioned as important too.

Some reported use energy statistics, energy reports and technical magazines. It seems that it is not very difficult to get statistical information and this information is available from partner organizations, technical journals, some magazines.

Interviewees know about guidelines on innovative energy saving and renewable energy. They mentioned, that they find information on web-pages (for example http://www.expozona.lt/lt.php/events, eid.18), ask colleagues or partner organisations. For some of the interviewees guidelines in English seem to be ok, but most prefer to have guidelines in Lithuanian language.

How to provide information?
The interviewed persons would like to get information in newsletters, in special magazines or in the internet. E-mail registration to get guidelines on special issues is of interest as well. Such way to get information was mentioned as time saving.

Economy
High investment costs in the first year seem to be a problem. The main ideas for possible solutions are to get governmental aid and additional loan rebate for these kinds of projects. All interviewed persons think that investment costs or the total lifecycle cost are basis for the decision process. The political decision of investor on using economical more expensive investments is the most important one. Economical incentives for choosing an innovative energy saving measures or renewable energy technologies are special loan, subsidy or potentially reduced energy bills.

Organisation
In all interviewed organisations the staff in charge of retrofitting consists of 3-4 persons. A main part of the work consists on preparing tendering documents. In most cases the interviewee thinks that the responsibility for retrofit projects lies with the building owner.

The most important time in the project for discussing the use of innovative energy saving and renewable energy technologies is in the earlier stage of the project, during the phase when the main ideas and financing planning are produced. Construction companies have networks where they can discuss experience on innovative energy saving with local universities and some other organisations.

5.1.10 Overall results interviews

General
The knowledge about energy efficient or renewable energy solutions seems to vary, both from person to person and country to country. However one of the interviewed persons grouped the order of knowledge and use for the solutions as follows:

1. measures to reduce the consumption (insulation, reduction of technical equipment such as lighting and ventilation)
2. high-efficient technology (ventilation with heat recovery, lighting)
3. renewable energy technologies (wood as fuel, solar/thermal, PV, heat pumps).

This is probably a good description of the situation.

Information
When searching for information, internet seems to be very popular. Google and special sites are mentioned. Magazines are also mentioned as a good source for information, but the time for reading them is limited. Seminars are informative, but often mentioned that there is no time and funds to attend. It seems that there are two main information barriers related with low energy solutions.

- The provision of information on available solutions (attention). Then the timing and how information reaches destination is important.
- Retrieving. That is, when being aware of a solution, to be able to find or retrieve information when it is needed.

There seems also to be an information gap between advertisements and the very technical information. There is a big demand of financial information like investment and operational cost, and also financial schemes. Lessons learned from other projects are very valuable. It seems to be a significant confusion on how to use the available information and the existing guidelines. The main decisions are made at a very early stage in the process (at the pre – design phase). General and economical information have to be provided to politicians as well as to the more technical personnel. Newsletter with targeted information seems to be a preferred way to receive information.

Economy
The answers show that many of the interviewed persons state that decisions should be based on life time cost, but in reality investment cost plays an important role since there is a limit for possible investments. In UK, Italy and Czech Republic there is no culture for life cycle costs analysis, the decision is based on investment costs.

In Norway, Denmark, Germany and Italy it is reported that the final decision is done by the politicians, but the technical staff/project leader makes the suggestions or influent the politicians.

If high investment cost can be met by loans, subsidy, the barrier with the investment cost can be lowered. Worrying information is that among some professionals there is a prevailing view that the financial costs associated with the high investment costs cannot be meet by the savings later on.

Economical incentives are known, but not always broadly. The incentives are not always useful, either because the building are owned by public authorities, there are very restricted conditions, or it takes a lot of effort and paperwork to get them and report on the results.

Organisation

At the end, politicians are the ones who make the decision on budget and investments. But in most cases the technical staff or external project leaders are those who propose the solutions. Most countries report that the very early stage of the project is when the decision on using low energy solutions is made. In most countries, the technical staff discusses energy saving matters with colleagues or through networks.

5.2 Questionnaire

Information/motivation e-mails were sent out to a large number of respondents. The table below shows the response in the different countries.

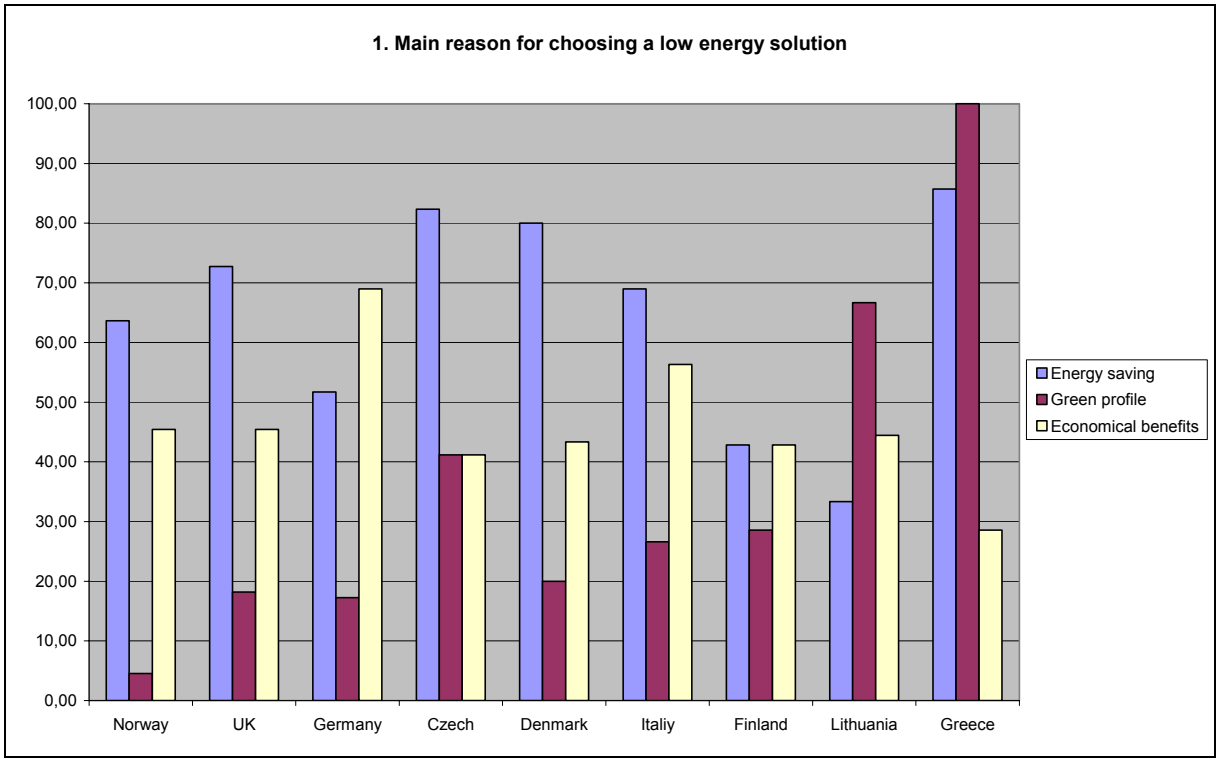
Country	Numbers send out	To what kind of persons?	respondents
Norway	50	Technical department, municipalities	22
Denmark	271	Technical department in the municipality	30
Finland	30	Partners of ongoing facility management and building commissioning projects (representing R&D activities, facility management and construction) 4 cities, Real Estate service managers and 3 Real Estate Investment companies	7
Germany	300 international addressees (~10 % German)	public administrations (12 answers)	29
	400 national contacts	Planners: architects, engineers (17 answers)	
UK	250	Researchers, architects, consultants and planners from municipalities.	11
Italy		The network of engineers: 1) Editions in the field of sustainability and environmental topics (they promote publications, tools, seminars, on-line services, etc. for private enterprises, associations and Public Administrations); engineers 2) National association for the rational use of energy 3) National web site for designers on building constructions; 4) National association for thermal insulation	451
Greece	32	Public administration, engineers and energy consultants	7
Czech republic	25	architects, designers, researchers, public administration	17
Lithuania	30	Consultants from Energy Consultants Association and people from University staff	9
TOTAL			583

The table shows that participation in Italy was very high, and thereby very reliable. The number of respondents in Finland, UK, Greece and Lithuania is a bit low. We therefore have to be careful with the interpretation for those countries, but they will give us an indication.

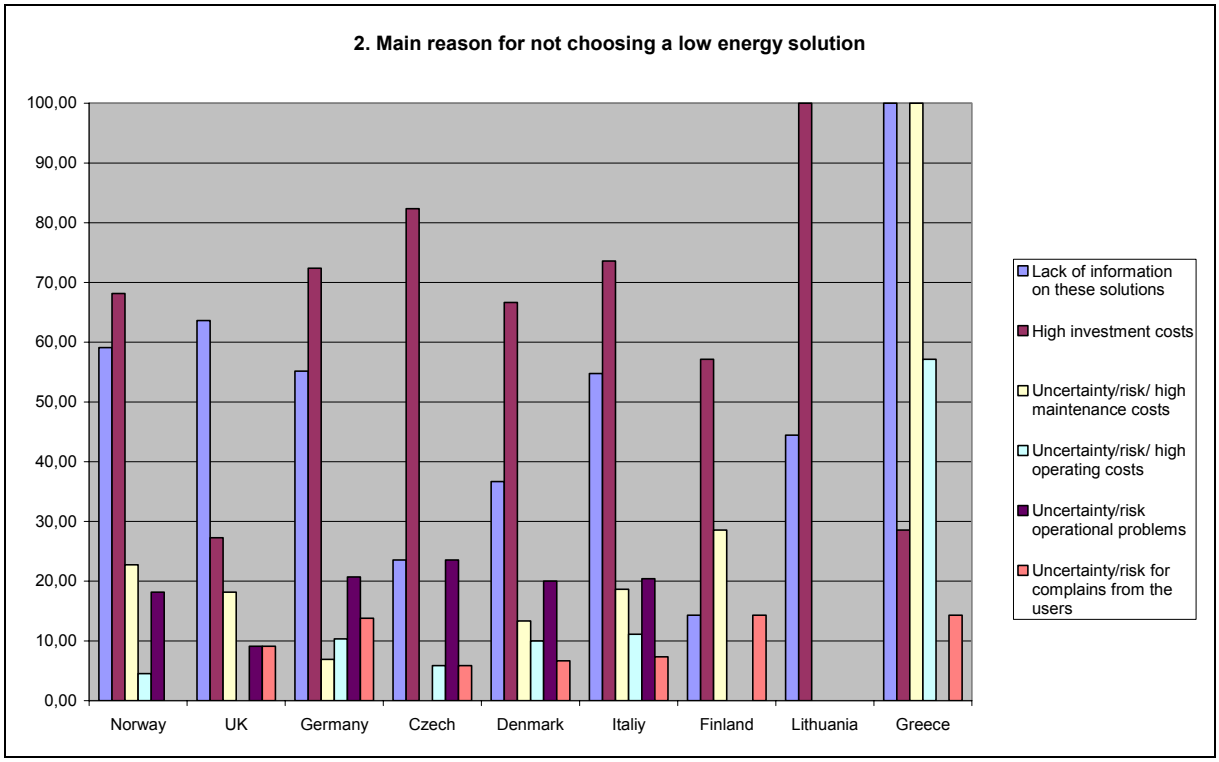
The questionnaire was made so that the respondents can give more than one answer to each question. The results are then the percentage of the respondents that think each answer is important.

The results from the questionnaire show that the main reason for choosing a low energy solution is energy saving, then the economical benefit. In Germany those two reasons have switched place. The only two countries with differences are Lithuania and Greece that report

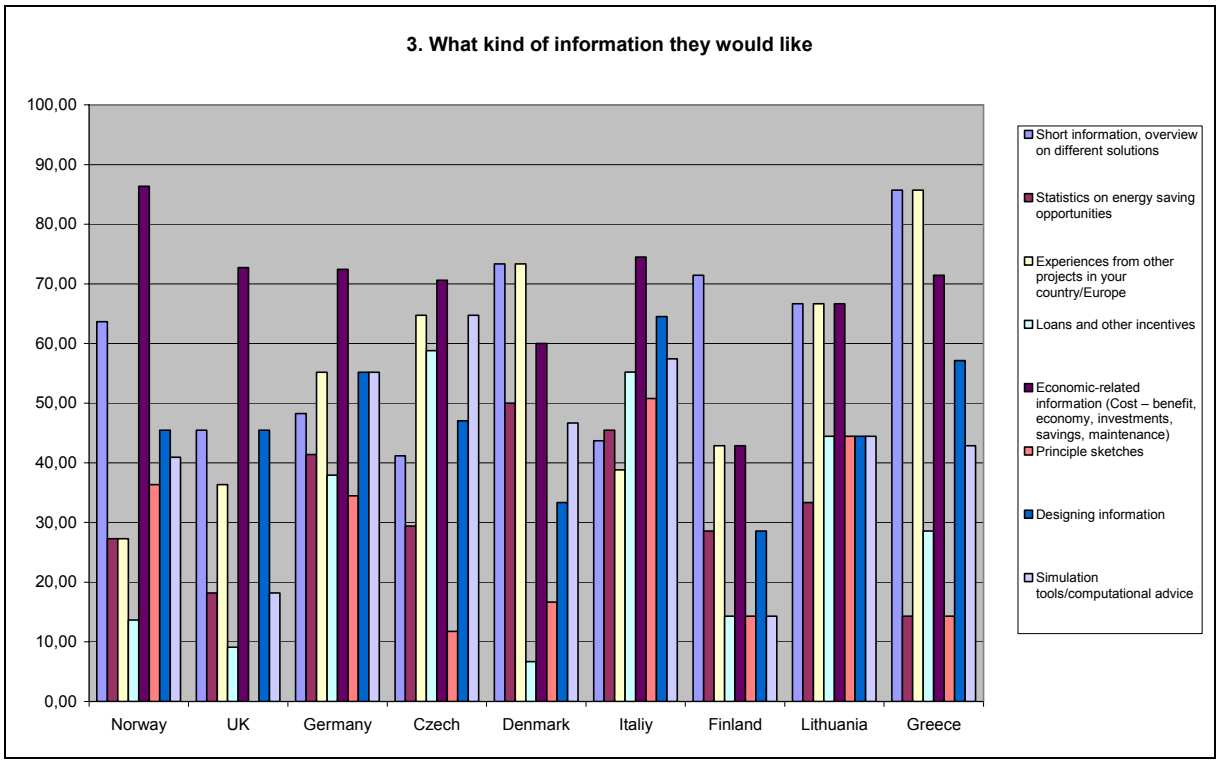
that the green image is the main reason. These two countries have low numbers of answers, but the tendency is clear. In Lithuania, most of the respondents were from Vilnius. In Vilnius the air pollution is quite a big problem and this can be the reason why respondents have chosen green image.



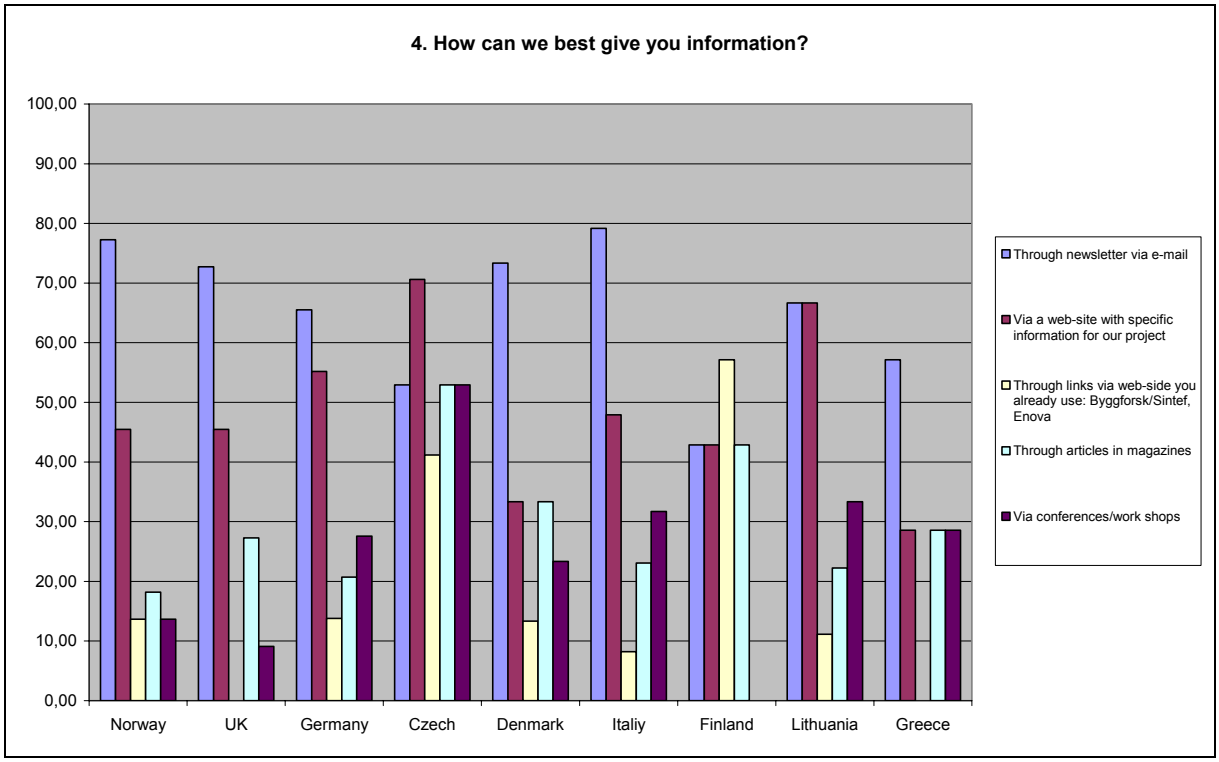
The main reason for not choosing a low energy solution is clearly high investment costs. It can not be determined whether it is the actual investment cost or the fact the investment cost is perceived as high. The second reason is lack of information, which is actually given as the main reason in the UK. In Greece, the main reasons are lack of information and uncertainty/risk/high maintenance costs. Once again, the number of answers in Greece is low, so the results are uncertain.



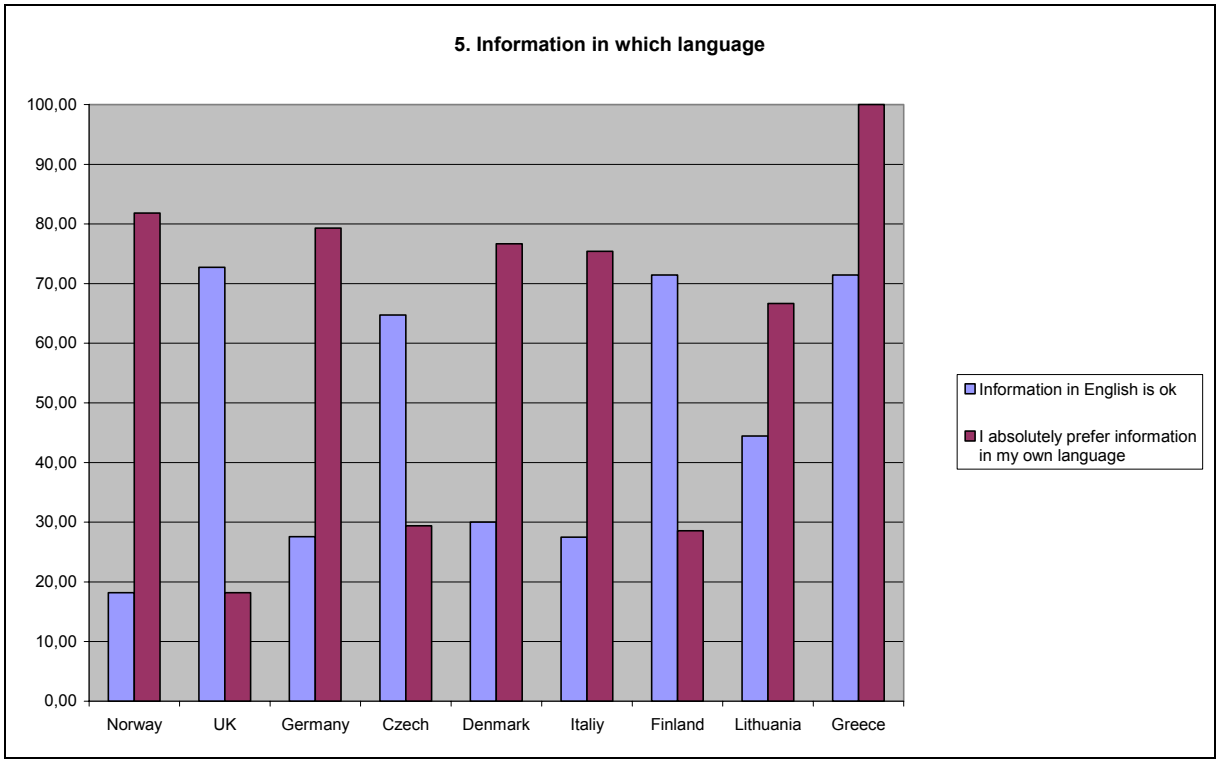
On the question about what kind of information is needed, economic-related information (cost-benefit) is ranked high, ca 70% or more in 6 of 9 countries, and especially in Norway (ca 86%).
Short information/overview is wanted by 60-70% or more in 5 of 9 countries; experience from other projects is wanted by 60% or more in 4 or 9 countries; design information by 45-65% in 6 of 9 countries. In Czech simulation tools/computational is also appreciated (65%)



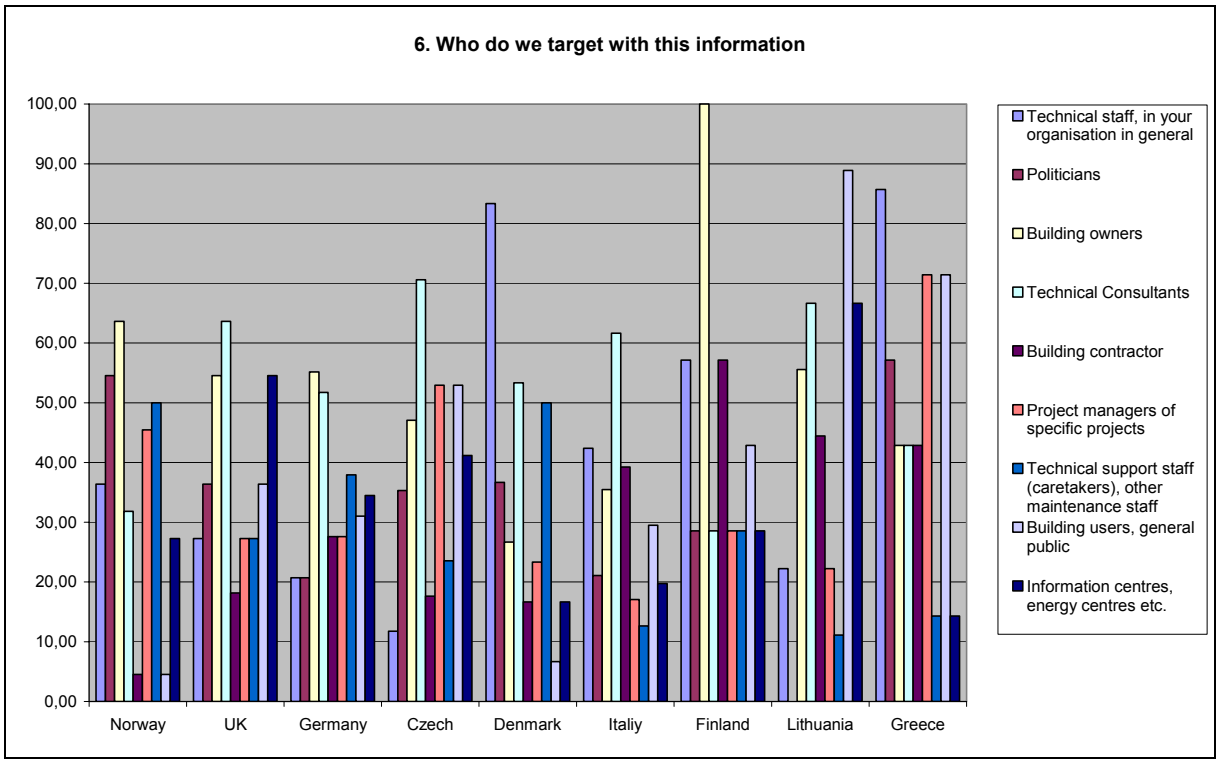
The best way to provide information is *through newsletters on e-mail*, followed by *web sites with specific information*. In Czech republic, web sites are ranked on top, and in Germany and Lithuania they are perceived nearly as good as e-mail. In Finland there is a close race between all the answers, with links via websites having a slight edge. However, it has to be understood that the answers in Finland are very few.



We see clearly that information in each country's language is preferable. UK (of course), Czech republic and Finland are positive about receiving information in English. It could be that Czech Republic and Finland are use to work with the English language in general.



Who has to be targeted with information varies from country to country. In Finland the building owner is the clear winner, followed by technical staff and building contractors. In Lithuania building users followed by technical consultants and energy centres. In Denmark and Greece technical staff is highest on the list. Technical consultants are regarded as an important target group in many countries, but in general it seems as a broad approach can be useful.



6 Conclusions

The main reason for choosing low energy or renewable energy solutions is energy saving. The main barrier for not choosing these solutions is investment costs, even if life cycle costs are reported in the interviews as to be taken into consideration. The second most important barrier is the lack of information. The information is needed at the very early pre-design phase of the project when also the economical strategies are determined. Information is needed to both the technical department and politicians at the municipal level. For discussions and advice to the technical department, their consultants are an important target group.

The information needed during the decision phase are investment costs, energy savings, a general overview of each solution proposed with experience from other projects and its benefits/limitations. For a lot of people the lack of time is a serious limitation. The information must therefore be easy to find and retrieve, easy to understand and easy to apply. For most of the countries, the information is preferred in their own language. The best way to provide information seems to be newsletters and internet.

7 Appendix

7.1 Interview guide

The interviewed person and his/her role:
1 Male/female?
2 Age?
3 What is your position in the organisation, and what is your function?

Retrofit innovation, low energy solutions, general

1. What kind of solutions do you think of as innovative energy saving and renewable energy technologies?
   (alternatives, help for the interviewer, mark with "x")
   Innovative insulation
   High – efficient windows
   Hybrid ventilation
   Improved day lighting
   Absorption cooling (solar assistant cooling)
   Reduce of overheating, using building mass and shading (passive)
   Heat pumps
   Solar thermal collectors
   Passive Solar gains
   PV-integration
   LCA
   Others: specify

2. Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?

3. Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?
   If you apply some of these technologies, which ones?

4. What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?

H2 - Economy

1. Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)

2. Are the investment costs or the total lifecycle cost basis for the decision process?

3. Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)

4. Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).

5. Do you know where to get this kind of information?

H3 – Organisation

1. Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)

2. Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?

3. When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?

4. Who will have the main responsibility for choosing energy friendly solutions?

5. Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
6. The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)

H1 -Information

1. How do you normally hear about innovative energy saving and renewable energy technologies?

2. What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc)

3. Where do you normally search for information?
   Research institutes
   Library (guidelines and books)
   Google
   Special web-sites (specify)
   Magazines, technical or others
      Associations: magazine, web-site, member bookstore
      Teaching materials, textbooks
      Conferenses
      Courses
      Friends and business contacts
      Colleagues

4. What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?
   (general info on technologies, saving potential, economical incitements, guidelines, calculation tools etc.)

5. Other people in the project organisation (se below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)

Project leader, your organisation
Technical staff, in your organisation general
Building owner
Technical support staff in building (caretaker), other maintenance staff
Building user, leader (principle etc.), general user (teacher, employees)
Public administrator networks
Technical Consultants
Building contractor

6. What kind of information do they need? (read to the respondent) (prioritise, and specify who)
   Energy saving potential
      Statistics
   Cost, loans and other incitements
      Cost – benefit, economy (investments, savings, maintenance)
      Short information, overview
   Principle sketches
   Designing information
   Calculation advice
   Knowledge about possibilities

7. Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?

8. Do you have information about the energy saving potentials of innovative technologies?
   If yes, is this information available? Where? (Which source)

9. Do you know about guidelines on innovative energy saving and renewable energy technologies?

   If yes: How do you get these guidelines?
   Web-pages, free (examples?)
   Subscriptions, (by post), what kind?
   Subscription, internet based versions
   Call on demand – infocentre, etc (where?)
   Publisher. Bookstore, institute, institute sales office?
   Others?

10. What are the barriers for not know/get this guidelines:
      Don't know where to search
      Too expensive
      don't know about any web-page
      don't have subscription /not member,
      too expensive subscription
      others

11. Where would you normally search for guidelines in general?

12. How can we best give you and others information and help on innovative energy saving and renewable energy technologies?

13. Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
    (these alternatives are only help for you as a interviewer)
    - little time to keep up to date
    - don't naturally get across this information,
    - Hard to search for information,
    - hard to know when new info is available
    - don't know about the distributor of information.
    - don't read the right magazine,
    - don't seek for information, only pick up "what falls on your noze"

THANK YOU!

7.2 Questionnaire - EU-project BRITA in Pubs

(copy from the website http://www.brita-in-pubs.com)

This is a questionnaire about use/no use of innovative energy saving and renewable energy technologies. These are for instants low-energy windows, heat pumps, solar cells, hybrid ventilation, etc.

1: What would be your main reason for choosing a low energy solution?

- ☐ *Energy saving*
- ☐ *Green profile*
- ☐ *Economical benefits*

2: What would be your main reason for not choosing a low energy solution? (why low energy solutions aren't more popular?)

- ☐ *Lack of information on these solutions*
- ☐ *High investment costs*
- ☐ *Uncertainty/risk/ high maintenance costs*
- ☐ *Uncertainty/risk/ high operating costs*
- ☐ *Uncertainty/risk operational problems*
- ☐ *Uncertainty/risk for complains from the users*

3: What kind of information would you like to receive?

- ☐ *Short information, overview on different solutions*
- ☐ *Statistics on energy saving opportunities*
- ☐ *Experiences from other projects in your country/Europe*
- ☐ *Loans and other incentives*
- ☐ *Economic-related information (Cost – benefit, economy, investments, savings, maintenance)*
- ☐ *Principle sketches*
- ☐ *Design information*
- ☐ *Simulation tools/computational advice*

4: How can we best give you that information?

- ☐ *Through* n*ewsletter via e-mail*
- ☐ *Via a web-site with specific information for our project*
- ☐ *Through links via web-side you already use: Byggforsk/Sintef, Enova, others*
- ☐ *Through articles in magazines*
- ☐ *Via conferences/work shops*

5: In which language?

- ☐ *Information in English is ok*
- ☐ *I absolutely prefer information in my own language*

6: Who do we target with this information? To whom should we distribute this information?

- ☐ *Technical staff, in your organisation in general*
- ☐ *Politicians*
- ☐ *Building owners*
- ☐ *Technical Consultants*
- ☐ *Building contractors*
- ☐ *Project managers of specific projects*
- ☐ *Technical support staff (caretakers), other maintenance staff*
- ☐ *Building users, general public*
- ☐ *Information centres, energy centres etc.*

7.3 Motivation e-mail

(sent out in the national language to persons from the target group "decision makers". This example is the Norwegian motivation e-mail translated to English.)

Hello!

We need your opinion on how we can give you better information on energy saving solutions.

Byggforsk and Sintef (your institutions) are part of a EU project on
Innovative energy saving and renewable energy technologies: BRITA in PuBs - Bringing retrofit innovation to application in public buildings, see more information on our web-site www.brita-in-pubs.com

On our web-site we have a questionnaire with 6 easy questions we would like you to answer. We will use this answers to provide you with better information on energy saving solutions through our website, newsletters, guidelines, calculation tools etc. on subjects like heat pumps, solar energy, daylight, passive cooling etc. You are contacted because you are connected to a network where our contact person has agreed that this can be of interest for you. The answers will be used for statistical purpose only and reported country by country in this project as input for giving information back to you.

To join our investigation, click here www.brita-in-pubs.com. You will find a short presentation on the questionnaire and some flags on the right-hand side of the page. Click the flag for your country, and the questions will show up. It is important that you answer the questions in your own language.

If you are interested in our newsletter, have a look to the menu on the left-hand side to sign up.

Thank you for your help!

7.4 Results of the interviews

7.4.1 Norway

Interviewee N1:

The interviewed person and his/her role:
Male,
Age: 44 years
Position: Department Engineer, department of Engineering, Agriculture and Environment since 2004. (Small municipality, only 3000 inhabitants. Property management and refurbishment is only a part of their business) He is clerk of works on the projects of refurbishment and new construction on schools, community centre etc.

Retrofit innovation, low energy solutions, general

1) Heat pumps and fuel pellets mentioned. When asking about the others, his response he has been discussing them with others, which is all.
2) His department, Engineering, Agriculture and Environment. They are 5 technical employees, additional 3 persons on agriculture, 7 persons on management/operation.
3) They have no such policy in the municipality. They focus on it in the project when the opportunity is there. In this last project, fuel pellets was discussed. Then the trace of a big water pipe was changed to go directly outside the doorstep, so a solution with heat pump was decided because it was possible without to much extra costs.
4) Costs are the main reason. Both investment costs and maintenance/ operating costs are of importance. The fuel pellet solution is known to have some operating problems. When the water pipe came along, that was more a one time investment and was preferred.

H2 Economy

1) It is always a question about investment costs, and also operating costs. It can be a bit difficult to compare different solutions as the energy prices (electric) varies a lot during a year and form one year to another. This give unlike results of what is the most economical alternative. They have a cooperation of 9 municipalities that by electric power together on the "stock exchange ".
2) They calculate both investment costs and Life Cycle costs.
3) The municipal council does the decision. The Engineering department does the detailed statement, find useful solutions and present a solution. The decision depends of if the politicians are energy focused. If the solution saves a lot of energy, it is easier to convince them.
4) Incentives: Yes, they have got support from ENOVA. They god help from their consultant to write the application. He already knew about ENOVA, but stress that an interested and good consultant is very important to succeed with this kind of solutions. A criterion for choosing consultant should be if he knows about incentives.
5) He would start to ask Skagerak, their energy supplier.

H3 Organisation

1) They are 5 persons. Refurbishment is only a part of their responsibility. They also deal with roads, wiring (electrical installation) and other engineering matters.
   The department of Engineering, Agriculture and Environment runs the projects. Sometimes they have hired people to work for them, it depends on the project. .
3) The pre-engineering phase or early pre-engineering phase.
4) The responsible project leader in the municipality or the hired consultant.
5) The network is not so very good. They have a 9 municipality cooperation, and they have an intention to succeed, but still have a lot to work on. The contact with other municipalities varies.

H1 Information

1) And 2) The information is casual, what accidentally comes in with the post (advertisement) and mass media (radio, television, newspapers, magazines (Teknisk Ukeblad, Kommunalteknikk). The initiative you have to take yourself. He reads limited amount of magazine because of lack of time.
3) Internet. Google and similar sites. He would search for heat pumps or similar, and investigate further from the results given from this search.
4) He focus on first define which source you have, and then get help on how to exploit this the best way. In the pre-engineering phase the investment costs are very important. Also operating costs and short time and long time maintenance costs. Estimate within 50-80.000 NOK is required, this is more critical for smaller municipalities.
5) The engineering department and the politicians are the one that need the information the most. It is important that the politicians also get information; it is they who formally order the detailed statements for this kind of solutions.
7) No, he doesn't use this kind of statistics: Maybe the 9 municipalitie cooperation have some.
8) Energy statistics on innovative solutions: No.
9) Guidelines: he doesn't know of any.
12) Where search? He would have tried the internet.
13) How to best give information: He would have liked to have more focus on this kind of solutions, so this has been more automatically a part of the projects. Links via the internet, a page with possibility to write in questions, ask for information. This must be very simple websites, easy to get information and easy to navigate so you quickly find what you search for. The pages should be mainly in Norwegian. He is also interested in newsletter (as long as they are free of charge)
14) Yes, it can be hard. They are a small municipality with few employees, and therefore have to know a little bit about everything. There is a small chance to be specialist.

He is positive to receive newsletter.

Interviewee N2:

The interviewed person and his/her role:

Female,
Age: 39 years
Position: Head of department Property management, since 2004.

Retrofit innovation, low energy solutions, general

1) Fuel pellets, heat pumps, vater based heating, solar heating systems mentioned.

2) The facility management department and their project leader have the best knowledge. It also depends on the type of contact used for the project. Lifetime is important for choice of solutions, so is also energy use. Innovative solutins is not what they choose first.
3) The policy in the municipality is to use vater based heating systems in new buildings with more than 1000m^2 floor area, and heatpumps. There is a decision in the municipality counsil from 2001 to use renewable energy, preferably heat pumps.
4) There is a decision in the municipality counsil that the municipality wants to be environmentally conscious. Later on the electricity has been more expensive, and they want to save money. Solutions combinbin electricity and oil is then choosen. Another reason in price. The pioneer municipality have to take the extra costs with innovative solutions themselv. When they do a cost/ benefit analyse, it is often not economical defendable. A third reason is lack of knowledge. That meens things take more time and rices the price.

H2 Economy

1) No, investment costs are ok. They calculate the payback time. Normally they get yes from the politicians as long as the investment costs are way to high.
2) They consider Life Cycle costs. Calculations for the cost of use and maintenance phase must also be presented to the politicians. Lifetime is also important
3) The municipal council does the decision. The administration (facility management department omn behaf of the city manager) does the detailed statement , find usful solutions and present a solution. This community have a overstretched economy. Still at the last project when they had to cut the budgets, the heat pump was kept, they postponed refurbishment of some olderpart of the building, and allowed the higher investmentcost for the Heat pump.
4) Incentives: They have got support from ENOVA in one project. Also from ERO for skills upgrading. There ara also firms that can install energy saving systems; they pay the installations, but get the profit of the savings. Rembra does not recommend this kind of solution.
5) She would ask Husbanken, Grip, call Enova, use the internet or ask in their network of municipalities.

H3 Organisation

1) and 2) The municipality have reduced workforce. They buy competence from one of their neighbour municipalities. How much they by varies with the project.

By project leadership
Use own project leaders and by entrepreneurs
For smaller projects they use own project leader, own staff and some extra persons.

They have also started to look at privat/public cooperation, but they have not yet used it.

3) early phase of the project, as early as possible. Fpre-engineering phase or even before, maybe before the project is approved. If it is to late in the projectphase, the money are already given out. Hurry is a problem. Low energy use and energy efficient solutions should have been a part of their routine she says.
4) The politicians do the final decision, the property manager department do the detailed statement. Her department works on making standards and routines to implement more of this cosnidderations of low energy use.
5) They use their network actively

H1 Information

1) Newspapwers, magazines (Komunalbygg), companies that call them, advertisement, info about courses and seminars, network.
2) Statistics, information sheets from OPAC, technical detailed statements.
3) Call others, for instance in the network, Government office, NHO, the internet. Call companies with expertise like OPAC, Byggforsk etc.She sees it as positive that they get a lot of information send to them.
4) She want guidelines. When mention planned subjects for our guidelines she says yes, it is all very interesting. Especily ecperience from other municipalities is valuable. Economical calculations: investment costs, savings, savings due to time, is it used much (also interested in information from other countries. Info on operation, compared to traditional solutions is of interests, as well as why this solutions is better (better operation, longer operation time)
5) Other people in the organisation: Project leaders and their boss. City managers, chairman and politicians need more information, but they need more concise information. (why ust this, economical reasons, environmental reasons). The facility mangemend department can get more detailed information, and this should be given priority. A recommendation from the county governor would have been a strength.
6) Energy statistics: They whis more of this. They get statistics from Hafslund (electricity supplyer) 6 times a year, but need also visualised info. Calculations from consultants, statistics on electricity prizes and possible energy savings would have been nice.
10) Guidelines: she doesn'n know of any.
15) Where to search? First she would asked her colleagues if they have some recommendations where to search. Then GRIP, OPAC, Byggforsk, Holte Prosjekt, NTNU.
16) How to best give information: She prefer something written, with a reason why use this, then statistics. She likes reminders on e-mail, it is easyer and doesn't "drown" in all the rest. She prefer to have something electronically or on paper.
17) She tries to be attentive and up to date. Information should be sent out to the municipalities, she says, it is hard to be active on all fields. Lack of time is also a problem. FOBE is a good information channel. Comparison on energy savings between municipalities is something else she wish for

He is positive to receive newsletter.

Interviewee N3:

The interviewed person and his/her role:

Male,
Age: 57 years
Position: Head of department Property management, (4 years).

Retrofit innovation, low energy solutions, general

1) Heat pumps, solar heating systems, fuel pellets mentioned at first. When asking about other solutions/giving him some hints he tells us they have hybrid ventilation in a school and that they consider low energy windows (low U-value)
2) The facility managers have the best knowledge. Then three projects leaders and him.
3) There is a decision in the municipality counsil to consider heat pumps in new buildings, bigger extensions and refurbishments if water based heating

system.(decision made in 1999/2000) They have good experience with heat pumps, and the municipality consider it as obvious to consider.

4) In their community it is easy access to the ground water. This results that with using ground water the investments and savings results in the systems pays of after 8-10 years which is profitable.

H2 Economy

1) High investment costs are normally not a problem. The Property Management department have to show a good calculation, and investment cost are acceptable if savings in the user phase. The politicians are aware of the problems and are willing to help out.
2) LCC is basis for the decision.
3) The investments are on to politican discussions. The Property Management department developes plans for 4 years with plans for investments and consequences for other "post on the program". They makes a recommendation to the municipality counsil who again do the final decision. If they consider investment later on that extend the budget, the need to do another considereation in the municipality council.
4) No. They have send application to Enova, but the projects in the municipality has not fit to Enovas systems.
5) Enova. Perpetum, the energy centre in Østfold (their region). Perpetum is to his opinion well orientated on possibilities and is used as consultants for the Municipality.

H3 Organisation

1) The Property Management department consist of 35 persons including Facilities Managers (caretakers), cleaners, management leader, leader of dayly maintenance (smaller), leader of refurbishment and one responsible for new constructions. They use their own staf as leaders, and hires consultants in HVAC, architects, electricticity. Type of contract is considerd from project to project.
2) The retrofitting is managed by the municipality administration (facility management), the users are represented in the "construction committee", and will be asked for their needs. The "city manager" the formal responsible person, but is physicly to persons, one responsible for helth and social services, the other for schools and cultural matters. The Facility Management department are responsible for carry out the projects. (steering and management)
3) The most important phase is the pre-engineering phase, or the early phase of the pre-engineering phase. First they look at needs and number of square meters. Then they look into heating and energy use. In this phase they do prelimnary studies and calculations. This they of the do together with consultants. The municipality gives in the requests and asks for further considerations.
4) Refer to the the decision in the municipality counsil mentioned in question 3) in Retrofit innovation. If the investments pays of after 8-10 years, the project leader decide. Special solutions outside of this are bigger discussions.
5) They are in a network with other municipalities in the region.

H1 Information

1) Courses and seminars he mentions first. But they don't attent very many because the seminars are expensive. They attend seminars organised by Teknisk forening, Norges bygg- og eiendomsforening, Teknologisk Institutt, etc. They try to choos seminars according to responsibilities: leagal matters and standards for project leaders, energy savings, ventilation etc for facility managers.

Literature: Byggeindustrien, Kommunalteknikk, Bygg-aktuelt. They look for projects and se how others have solved similar problems.

2) Magazines: General description of the project; arkitetual, technical etc. Spesific information they searc for elswere.
3) Technical literature, magazine. Ideas to contact persons.
   Internett: serch for specific information. Search on professional/technical web-sites (like Byggforsk)
4) (Interviewer have given examples) energy savings: How much saved? Choise for materials: steel, concrete, wood etc.Prices. Examples/experience on operatin phase. They have a good network of consultants to ask.
5) Other people in the organisation: Depends on the zise of the project. The users are the most of interest to include. On technical solutions the Facility Management department does the decision, based on durability, operating economy etc. The users normally ask questions but accept what they get.
6) Energy statistics: They use statistics on energy (electric) used. They have weekly and monthly check on used energy for the facilities. They are connected to Bergen energy and buy energy on "stock exchange" They are member of a energy (electric) group in Østfold witn 8 member municipalities. A broker does the job for then, which is profitable (they by for 100 millions NOK a year.
   They have energy datas for energy use and saving on their nursing home (heat pump) for first year, 3 and 4. year. They use no recived datas from other buildings. They also to little comparison with other municipalities, only rough numbers within the network. They do check on those who have similar solutions before investments.
9) Guidelines: He doesn't know about any guidelines, but yes, would have been of interest. Where to searc? He doesn't know, but suggest to start at the internet, or ask the consultants in Perpetum.
13) How to best give information: Newsletter is a good idea. Very often is it hard to find back the information the day you need it. Search on Byggforsk web-site would be an alternative.
14) The amount of information makes it hard to be updated. The amount is huge!

He is positive to receive newsletter, and would like to learn how to get information.

Interviewee N4:
The interviewed person and his/her role:
Male,
Age: 44 years
Position: Property management since year 2000.

Retrofit innovation, low energy solutions, general

1) Heat pumps, district heating with bio pellets, solar heating systems, wind power, wave power mentioned at first. When asking about other solutions, he mentioned windows with low U-value, energy effective solutions and BEMS (Building energy management system) (BEMS are installed in all large buildings, 15-25% savings according to existing systems, System-name Benima).
2) Everybody in the Property Management department have the knowledge. They work close together, and are also the ones who are responsible for Facility Management. The department consist of one Facilities Manager and 4 assistant Facilities Managers. Following up the systems are an important part of succsess whith this kind of systems.

3) They use energy efficient solutions. The impression is that they are really engaged and interested. They use heatpumps in many of their buildings, bio pellets, high efficient windows etc.
4) Saving energy costs are the main reason for choosing this kind of solutions. This is crucial. Energy use is the largest cost of management costs. Kwh saved is very important, but they also focus on work closely with satble indoor environment.

H2 Economy

1) This has not been a problem. The politicians have been very open to their proposals and very positive. The Property Management department have presented solutions, energy accounts, investmentcosts etc.
2) LCC is basis for the decision.
3) The investments are approved by the local authority (politician). The Property Mangement department does the research, evaluation and give the recommendations. In fact they do the main decition, the politician give priority compared to other measures. The Property Management department often have choosen to give priority to this kind of investments, and in stead used old furniture the first years. "you have to belive in it – then it gives results!"
4) Incentives: ENOVA. They have mixed experiences. The impression of ENOVA is bureaucratic. They demand a lot of paper work and executive work, and gives little help and money. He don't know about other incitements. Earlyer they got good help and money from Enøk in Vestfold county. This is turned in to Perpetum energy and environment AS, but the money now is by ENOVA. Perpetum still helps them.
5) He thinks it is hard to get an overview over incitements. "Maybe on internet?"

H3 Organisation

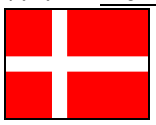
1) The Property Management department consist of one Facilities Manager and 4 assistant Facilities Managers. They work close together, and are also the ones who are responsible for Facility Management.
2) It depends on how busy they are and how many projects going on. Often he is project responsible, but hires the project leader. They often hire expertise and clerk of works.The user have noe responsibilities, they have to "take what they get" :)
5) They have network with other municipality in the region. Meetings are 3-4 times a year. Then they have discussions, ask questions about solutins or or other experience in other municipalities, tells about results/experience from their own work. They also have active contact on telephone inbetween. Very nice he says.

H1 Information

1) and 2) He reads about this solutions, normally in professional magazines, and also get much information by the local energy consultant agency, named Perpetum. They normally also get some info by mail, but they normally search for information if there is something special they are interested in.
5) They use a system called Sitek, an Australian system. Else they use professional magazines (Glass og fasade, Offentlig handel, Bygg-aktuelt, Murmesteren, Rørfag, Norsk VVS, Byggmesterene and Gassmagasinet), energy saving reports (magazine), information from others, and seminars (seminars for building owners. Seminars held by FBA, Bergen energi, Komunalteknikk) normally they have a representant each year on a seminar to learn abaut "latest news"
6) Good experiences trough several years, projects that have been in use for 1-5 years. Ideas of all kind of things you have to think about and remember. Help with writing the buyer specification. Good advices and guidance to really get what you want.

7) It is the city manager who does the priority, both for the sort time and long time economically consequesnes. The building users normally takes what they get. (their focus is on their business, as pedagogic etc.)
8) -
9) Statistics mostly from the BEMS-system. They got new system from 2005. They have good energy statistics from their own buildings.
10) They get information in the pre-design phase, throught consultants and technical experts.
11) He doesn't know about any guidelines, but would like to have some.
12) He would search for such guidelines maybe at ENOVA, internet, by talking to others, asking the Perpetum company, Bergen energy etc.
13) How to best give information:
    Link to the internet, maybe through "Nasjonal rådgivingstjeneste for skolebygg" (network).
    Also want more time to keep updated. Use of referensgroups and network is good.
    Guidelines in englis is ok, no problems. He is also very interested in solutions used in Europe and their experience. He mention information about heation of windows (wire in the glass) and warm wather (excess heat from fabrics etc.)

7.4.2 Denmark



Answers from 5 interviews carried out in Denmark.
The interviewed person and his/her role:
Male/female? M: 3 F: 2
Age? 42/38/51/46/50

- What is your position in the organisation, and what is your function?
- Leader of housing department
- Coordinator for public guidance in technical matters
- Coordinating project leader for the administration of public buildings and areas
- Administrative consultant and Agenda 21 coordinator
- Co-worker in the plan division for sustainable planning of building and overall planning of areas.

Retrofit innovation, low energy solutions, general
What kind of solutions do you think of as innovative energy saving and renewable energy technologies?

(alternatives, help for the interviewer, mark with "x")
Innovative insulation 111
High – efficient windows 111
Hybrid ventilation 111
Improved day lighting 111
Absorption cooling (solar assistant cooling)
Reduce of overheating, using building mass and shading (passive) 1
Heat pumps 1
Solar thermal collectors 111
Passive Solar gains 1
PV-integration 1111
LCA
Others: specify:
Use of buildings 1, zoning 1, shading from trees 1, use of rainwater in toilets 1, fuel cells 1

Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?
Person interviewed: 111
Agenda 21 co-worker: 11
4-5 persons working with aspects of operation: 11 (driftafdeling)
Environmental supervisor: 1
Building consultants: 11

Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?
Mostly standard solutions: 11
Municipality is working on strategy: 1
Mostly special solutions are wanted, such as strategy for solar thermal collectors: 1
Have an overall plan for sustainable development and urban ecology: 1

Yes, we have a strategy: 1

If you apply some of these technologies, which ones?
Insulation: 11
Optimised automatic: 1
Technical installation: 1 (refrigerators, toilets etc.)
Solar thermal collectors: 11
Some – sometimes, not because of the specific energy efficient solutions but as part of overall project solution.
Hybrid ventilation:1
Energy efficient windows: 1
Improved day lighting: 1
LCA: 1

What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?
Economy: 111
The possibility of alternative financing (loans): 1
Lack of information: 1
Optimised solutions important (security – risks are not welcome and especially renovation projects are complicated. More options in building of new buildings): 1
When choosing renewable energy techniques it is the result of focussing on this specific technology as part of an demonstration project, but focus is on the actual energy saving: 1
Lack of documented effect of technologies: 1

H1 -Information
How do you normally hear about innovative energy saving and renewable energy technologies?

- Advertisement 1
- Magazines 11111
- Colleagues 11
- Instructions/ supervision 11
- Statistics 11
- Newsletters 111
- Other:

seminars (major and public scientific institutions) 11, networks 11, the internet 1, courses 1

What kind of information do you get?
Technical: 11
Experiences (examples): 11
Overall information: 11 (to begin with thereafter more specific technical information)

Where do you normally search for information?
Research institutes 111
Library (guidelines and books) 11 (research libraries)
Google 111
Special web-sites (specify) 1111
Magazines, technical or others 1111
Associations: magazine, web-site, member bookstore 11
Teaching materials, textbooks

Conferences 1111
Courses 11
Friends and business contacts 111
Colleagues 111

What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?

- Technologies
- saving potential: 111
- economical incitements: 11 (technical issues has the political interest, but the economy sets the decision)
- guidelines: 1 (as part of the building project)
- calculation tools
- other:

environmental economy – easy to integrate 1, aesthetic issues 1, overview – thereafter specific technical information - according to the answers in 3b, nature/landscape 1

Other people in the project organisation (se below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)

Project leader, your organisation 1111 (like school inspector)
Technical staff, in your organisation general 1 (green accounting, energy saving)
Building owner 1
Technical support staff in building (caretaker), other maintenance staff 111 (caretaking, seen as very important)
Building user, leader (principle etc.), general user (teacher, employees) 111
Public administrator networks
Technical Consultants 1 (specific technical information)
Building contractor 1 (specific technical information)

Politicians (missing on this list) 1

What kind of information do they need? (read to the respondent) (prioritise, and specify who)

Energy saving potential 1111 (technicians)
Statistics
Cost, loans and other incitements 11
Cost – benefit, economy (investments, savings, maintenance)
Short information, overview
Principle sketches
Designing information
Calculation advice
Knowledge about possibilities: simple real economic models are needed as are simple information material for the maintenance people 1, more specific technical information 1

Do you use any kind of - about energy solutions? :
energy statistics 1111 (for key numbers etc.)
energy reports 11
news magazine 11
Green accounting 1
ELO-report 11 (report according to Danish environmental assessment law)

Do you have information about the energy saving potentials of innovative technologies?
No 1 (asks supervisor)
Yes 1111 (answer to where given in 3b, from "Byøkologisk netværk")

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
Yes 11 (do not trust the information given)
No 111 (but time consuming)

(these alternatives are only help for you as a interviewer)
little time to keep up to date 1
don't naturally get across this information,
Hard to search for information,
hard to know when new info is available
don't know about the distributor of information.
don't read the right magazine,
don't seek for information, only pick up "what falls on your noze"

Do you know about guidelines on innovative energy saving and renewable energy technologies?
Yes! 1
If yes: How do you get these guidelines?
Web-pages, free (examples?) 111 (prøvestation for solenergi, TI)
Subscriptions, (by post), what kind? 1111 (magazine, news from research institute, literature)
Subscription, internet based versions 1
Call on demand – infocentre, etc (where?) 11
Publisher. Bookstore, institute, institute sales office? 11 (research institute)
Others?

What are the barriers for not know/get this guidelines:
Don't know where to search 11 –yes, it is a problem
Too expensive 1 (time consuming)
don't know about any web-page 1
don't have subscription /not member 1
too expensive subscription 1
others – none 1, not to know the existence of the given possibility 1

Where would you normally search for guidelines in general? The internet 1, as mentioned above 1

How can we best give you and others information and help on innovative energy saving and renewable energy technologies?
Newsletter 111
Networks 1
Meetings at the office with invited product presentations 11
As mentioned above 1 – supervision
On the internet 11 – with pictures
Seminars 11

Courses 1
Visit demonstration buildings 1
Articles (Stads- og Havneingeniøren) about renewable energy technologies

H2 - Economy
Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
No 11 (loans, subsidiaries, savings are taken into account and therefore there are no problem)
Yes 11 (privatised financing, agreement in city council, economic calculations can show reasons for adapt new technologies – but as it demands extra time and planning the standard solutions are kept, solutions must be individual as it will not be possible to make standard solutions)
Yes and no: 1 (the investment amount is not variable and there is a standard payback time for investments on 8 years)

Are the investment costs or the total lifecycle cost basis for the decision process?
Investment cost 1
Lifecycle 1
Both 1
None 1 (overall decision)

Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
Political decision 11111 (city council, but technical co-workers can influence the decisions)

Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
Yes 111 (loan and subsidy is the same, Danish municipalities has the possibility to get loans from the Danish government for these issues – but not all municipalities are aware of that)
No 1 (but it is becoming an important factor)

Do you know where to get this kind of information?
Yes 111
No 1 (not systematically)

What kind of contract do you normally use?
Different – depending on the type of project 1
Don't know – do not think so 1
Have used a kind of "sale and rent" deal – like sale of a school and thereafter renting it, renewing it and then buy it back after 15 years 1
With standard contracts it is easier to apply innovative aspects where as with partnering the budget is too tight for that kind of things 1
Write that sustainability must be taken into account 1
Special solutions are possible, as to pay the investments for a school and let them pay their normal amout for bills. After e.g. 10 years the schools own the technical installations 1

H3 – Organisation
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
15/10 (maintenance)/ 1 person/ 5 (maintenance)/ 10

Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
The organisation 1
Consultant or one from department 1
The department hires external experts who gets technical support also from their own department 1
Technical staff 1
The responsible staff for that area – school e.g. 1

When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
Early 111 (as early as possible as the budget are set from the wanted solutions, so specific solutions must be chosen in the beginning of the project)
Whenever – now! Budget is central – but a general decision is needed. 1
In the decision phase 1

Who will have the main responsibility for choosing energy friendly solutions?
Politicians 1
Technicians 11
PR 1
Building owner 1
Decision maker 1
Builder 1
Project leader 1

Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
Yes 1111 (politically, but could be fun)
No 1 (national and international co-operation on its way)

What kind of information do you share in the network?
Overall information 11
None 11

The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)

7.4.3 Finland

Interviewee SF1:
14.4.2005: Interview with facility manager of a technology park with some 200 000 m^2

In addition to the written enquiry, some essential things came up in the interview:
"The essential thing is how to purchase the energy, energy negotiations, how to buy it. Money is always the final prize. If we can get off 20 % of the price in the negotiations, the equal saving by technical innovations and improvements is very difficult to achieve, in case if the output level (starting point) is not so bad"
"From the point of view of the technology park the satisfaction of the clients is very important. That`s why we have not so much enthusiasm to take untried or untested innovations into our use. We don´t long technical lapsus"
"The best improvements are such that make things easier for service personel to do; it is difficult to decrease the proper energy consumption more than 2-3 %, so that the price is most essential in terms of savings because we can immediately see these savings as money"

The answers to the written enquiry are as follows:
Personal info
Male, aged around 45-50 years
Current position: Director, Facility Management - at a technology park, volume about 200000 m^2
Since 1998
Previously: An internal consultant of a major rental house company for construction projects, information, quality and maintenance manual issues, including real estate maintenance systems

Recent refurbishmant projects: Change of use, about 500 m^2 for a new use
Testing environment, about 2000 m^2 main building equipped with air cooling unit and a new lift.

Retrofit innovation, low energy solutions, general
Who has an overview of energy friendly solutions for buildings/retrofit projects?
The respondent with a consultant, who is available and active all continuously.

What kind of low energy measures/solutions do you know about? Mention some.
Free cooling with natural outdoor air (wintertime)
Stepwise operation hours of equipment
Savings by adjustments of building automation

Do you have insides in the energy saving potentials of innovative technologies?
Where do you get this kind of information?
Air conditioning plant with electrical filtration (did not function properly, the intended class was E7), was taken when producer pushed it for "experimenting price" but taken off because of malfunctioning.
Themonet in Smart House, now 40 % less energy use than earlier with the removed 5 years old equipment.

Elecrtical glasing in Smart House (operates fine).
The source of information is the manufactures, who actively push their products.

Barriers
Do you have a policy for choosing energy friendly solutions in projects?
No.

What is the main reason for choosing (not choosing) an energy conservation and/or renewable energy technology in your building?
Enlightened "feels correct", experience
Renewable energy sources are no value by itself; their price is higher

Do you feel that you (or the decision maker) have enough insides in the energy saving potentials of innovative technologies?
Yes, ample of experience due to large enough scale and extent of operation, new information is pouring in because the producing industries are pushing it.

Economy
Energy saving solutions often clime high investment cost one year, and the savings will show following years. Is this a problem to your budgets?
It is not an obstacle (in-house culture is positive), but has to be taken into account. Investment for saving show up in balance sheet, and the savings have to be justified in annual budget. Bookkeeping problems arise as a positive outcome has to be shown.

Who can decide on using economical more expensive investments if the have reasonable payback time according to energy savings? (Political decision or technical decision)
Proposal is very close to being a decision, economy manager checks funding availability.

Do you know about any economical incitements for choosing an (innovative) low energy solution? (loan, subsidy, potential reduced energy bills, others)
Energy audits are an opportunity, hardly anything else. A novel system is arising, but currently not of significance: energy bills are the incitement.

Do you know where to get this kind of information?
Yes.

Are the investment cost or the full cost basis for the decision process?
Investment costs. Mostly but not entirely the investment costs.

If you could choose for your project a solutions that will potential will save a lot of money the coming 15 years, and an cheep (investment) standard solutions, what would you choose? Why?
Reliability in operation is critical, as the customers are paying the choice (lack of confidence is a major worry).

Organisation
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
Yes

Do you have networks etc. with other municipalities where you can discuss experience and knowledge on energy saving and/or innovative solutions?
Yes.

Who will have the main responsibility for a retrofit project?
- technical staff in the municipality
- building "owner" (major occupant)
- hired consultant
- other, specify: own organisation (the respondent)

Who will have the main responsibility for choosing energy friendly solutions?
The respondent

What kind of contracts do you normally use?
Varying; mainly traditional if time allows design phase, target price if no design time in advance, also DB (design - build)

When is, to your opinion, the most important time in the project for discussing using a innovative solution?
Very early, most preferably before the finishing of the previous project

And who will decide to do/not to do so?
The initiative by the providers / suppliers / designers

What kind of information (about energy efficient solutions) would you like in this phase of the process?
References; there is no willingness to be the first trial case

Do you think others in the project would need other kind of knowledge about this solutions in this phase?
Convincing (by practical experiences) that the equipment in operation functions; savings; reasonable easing of maintenance activities; how the changes can be done with ease and cheaply (flexibility for changes is important)

Information
Where do you normally search for information?
Internet, KH- and RT- files (in Finland Building Information Ltd publishes the RT Building Information File (RT = building information), the RATU Construction Productivity Information File (RATU = building production), the HEVAC Building Services Information File, and the KH Property Management File (KH = property management), each of which are updated regularly: the RT File ten times a year and other files three times a year. These files are available either in printed form or on CDs and product information is also available directly from website.)

How do you normally hear about energy efficient solutions today?
Consultants and mass exhibitions are the main source.

What kind of information do you get?
General learning in conversations, i.e. about the linking of automation systems

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
Yes, all of them in a systematical manner even rather carefully. Also checking the energy bills is informative.

Where do you search for information?
- —— Research institutes: Only for studies (which actually occur)
- —— Library (guidelines and books): No.
- X hakukoneella (google tms.) Google
- —— Special web-sites (specify): No

- —— Magazines, technical or others: to some extend
- —— Associations: magazine, web-site, member bookstore: No
- —— Teaching materials, textbooks: No (not any more, this phase has passed...)
- —— Conferences: Mass exhibitions
- —— Courses: No
- —— Friends and business contacts: This is a major source, in particular the private talks

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
It is very easy. knowledge/information is abundant and involvement is asked for.

What kind of information do you need? (priority)?
- —— energy savings potential: this too has an impact
- X price, loans and other expenses: this is primary, it is a matter of balance towards customer satisfaction

Interviewee SF2:
Personal info
Male, aged around 50 years
Current position: Director, Real Estate Services, construction manager, city with a population:of 70000 people
Since 1992
Previously: Construction manager, street constructions, gardens and repair shop (from 1994 on: Real Estate Services)
Recent refurbishment projects:
- renovation of schools, 1-2 overall annual renovation, misture damage repairs 10-20/yearly
- design-, construction- and maintenance errors, occasional errors like leaky taps
- annual- and maintenance repairs app. 100/year (e.g. renew of roof, change of windows). 60 schools and 40 kindergartens, 10 – 15 various types of use, built in different ages, no typical building-type defects.
- a directive 15 year program, made in the year 2002
- large projects: 4 year program
- small retrofits: 1-2 years program
- large renovation projects: A secondary school 4 mio €, High school 5 mio €, a hospital (old people's home) 3 mio €.
- the building stock is very varying: Schools, kindergartens, local hospital, sport facilities, youth centers, camp centers, and fire stations. The oldest buildings are 100 years old. The building boom stated in 70`s, new building decreased after 1995. At the moment renovation/new building relation 80/20, in 90`s 20/80.

Retrofit innovation, low energy solutions, general
Who has an overview of energy friendly solutions for buildings/retrofit projects?
The director (interviewee), building developer (3), LVI-technician (1), monitoring:
Control room operator (1).
140-150 building in monitoring and control, the total numbers of buildings is higher. There is 85 % of built volume under remote control. The targets without remote control will be monitored manually (district heating consumption). Some rural area school still runs by oil heating.
One experimental building has also sublevel electricity monitoring (European Green House target)

What kind of low energy measures/solutions do you know about? Mention some.
Solutions: Good insulation, heat recovery in ventilation – in the city program since 1980: Consumptions and costs monitoring launched 1980 – the software provided by Atmostek. European Green House project target: Sun wall
In renovation projects we have used highly approved solutions (no risks). For heating of City Gardens Green Houses we have selected heat pump based on ESCO-funding.
Energy consumption: Target or reference values
In renovation project we have no target values especially determined, the designer will do the evaluation. The retrofit projects will never be done just for energy related base. The reasons are: Installation of new ventilation system, lack of ventilation or defective ventilation, improvements corresponding to the new requirements.
Health officers, industrial safety, demands and needs of the users
Energy audits: Carried out 10 years ago, now a new cycle of audits in progress 2004-2005. Schools, nursery schools.
The share of audited buildings represents approximately 60 % of the total building stock.
MOTIVA-support has used – in some cities 100 % of the public buildings has been audited. (MOTIVA= The Finnish Energy Saving Center, according to the procedure all audits must be performed if one can use the public support for energy auditing)
Otherwise the energy saving activity is based on consumption monitoring, 25 years. Small repairs – windows etc – has been tried to do as soon as possible, in general the works with short payback time.
The activity is continuous and predictive maintenance-type activity, the city has existing such a procedure or tradition.

Do you have insides in the energy saving potentials of innovative technologies?
Building product industry – offers
Building service industry (HVAC) – building automation deliverers
The city participates the energy saving contract of communities (Existing official contract system)
The over-all monitoring is dispersed because of many doers. According to the interviewee, the management and emphasizing of energy saving activities must be controlled by Ministry of Environment, but it is not as strongly guided as needed (only light part in the operation of use). The interviewee would like to see the role of Ministry of Environment more pointed or important. MOTIVA is OK (see before); the energy department of Ministry of Trade and Industry is OK.

Barriers
Do you have a policy for choosing energy friendly solutions in projects?
Do you have procedure in your organization for selecting energy-efficient solutions?

Yes. We have trained experts in our use (e.g. ventilation), but the over-all view is insufficient or defective.
The running costs (operational costs) view has been incomplete (earlier led by architects).
We have a certain practice; an expert will check the plans.

What is the main reason for choosing (not choosing) an energy conservation and/or renewable energy technology in your building?
Life cycle costs: We have got acquainted into the software and used LCC-techniques in the certain parts of the high school renovation project. We have achieved certain results (positive results). The life-cycle-schedule, the way of thinking is still in the initial stage.
The city will purchase LCC-software for decision-making concerning building parts.
Annual €/kk/m2 must be controlled.
In local politics there is emerging interest for investments. The running costs – operation cost – thinking has broke through yet. The costs including capital costs were 25-30 mio € 10 years ago, nowadays 38 mio €. This is very important factor to follow. When we consider where we will invest in, what we have invested – it is going to be there next 100 years. The weakened communal economy is partially caused by the fact, that the communities collect more tasks but nothing will be removed. The stack is growing….

Do you feel that you (or the decision maker) have enough insides in the energy saving potentials of innovative technologies?
We need more information (e.g. like Work Efficiency Institute does, http://www.tts.fi/uk/index.html)
The resources of MOTIVA (Energy Saving Center) are not adequate, don't meet the case. There is a pressure against Ministry of Environment – the energy use of buildings represents 35 – 40 % of the total energy consumption.

Economy
Energy saving solutions often clime high investment cost one year, and the savings will show following years. Is this a problem to your budgets?
If the share of energy conservation measures is not more than 10 % in the total project costs, it will be accepted. No budget problems. Very rarely extra costs are 50 % in the retrofit projects.

Who can decide on using economical more expensive investments if the have reasonable payback time according to energy savings? (Political decision or technical decision)
The decision is technical – the technical personnel will do the selection of devices and technology. Politicians do not participate (and they should not let to do….)

Do you know about any economical incitements for choosing an (innovative) low energy solution? (Loan, subsidy, potential reduced energy bills, others)
No support has got for retrofit projects. The goal is reduction of energy consumption – the internal goal. If the consumption does increase 10 %, the saved money can be addressed to the maintenance.
We know all the forms of support instruments. Very good instruments do not exist, anyways. In some countries the energy saving solutions has been ranked. The energy directive, solutions caused by the directive and the solutions of directive are still unclear.

Do you know sources of information?
Yes.

Is the investment cost or the full cost basis for the decision process?
What is the criterion for decision? Investment costs or overall costs?
Full costs
Mostly but not entirely the investment costs. Until now the overall costs is the criterion, LCC-tool is coming (see above). Example tool: Ascot (from Denmark)

If you could choose for your project solutions that will potential will save a lot of money the coming 15 years, and cheep (investment) standard solutions, what would you choose? Why?
In the future we will choose energy saving solutions – there is a clear trend in the operation (15 years payback time is understandable). Industry uses shorter payback times, < 5 years. The energy prices affects to decision-making, of course. The electricity prices are going to fly the coop….. The rises are about 30 %. The heating energy prices are stable/in control.

Organisation
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
No. The building developers and HVAC-personnel will take care of new building and renovation, for the wield work of maintenance we have 5 field workers (every employee has the own area)

Do you have networks etc. with other municipalities where you can discuss experience and knowledge on energy saving and/or innovative solutions?
No. Our partners: Housing Company of the city (apartment buildings), water- and energy suppliers. No network in terms of innovation. There are programs available; participating is in the discussion stage.

Who will have the main responsibility for a retrofit project?
X - Technical staff in the municipality
X - building "owner" (major occupant)
- hired consultant
- other, specify
We have 3 building developers at the moment, who are responsible for sketch designs to the end of the application year. Earlier the tasks had been differentiated. The Real Estate Service Center represents both.

Who will have the main responsibility for choosing energy friendly solutions?
The Real Estate Service Center has the principal responsibility – the internal rent includes electricity, heat, and water. That is most convenient for bookkeeping and invoicing. Discussions about that if the tenant would pay, too.

What kind of contracts do you normally use?
Shared contract form – building-HAVC-electricity-automation. Lump-sum contract, the design should be done so far that we can get a fixed price offer.

When is, to your opinion, the most important time in the project for discussing using an innovative solution?
The design phase – in the bid stage everything is fixed already. In some exceptional case some falling of prices has been happened, not usually.

And who will decide to do/not to do so? (Innovative energy conservation activity)
Nobody- in general the executive level of Real Estate Services. No systematic actions, more or less occasional

What kind of information (about energy efficient solutions) would you like in this phase of the process?
A kind of a portal or file is needed.

Do you think others in the project would need other kind of knowledge about these solutions in this phase?
Yes – in general, added to the portal.

Information
Where do you normally search for information?
A short few row long hint would be enough. HVAC and electricity experts would inform the designer after that. Some part of architectural design can be done as our own work, other works are consulting works.

How do you normally hear about energy efficient solutions today?
Internet, publications, consultants. Seminar type events, e.g. organized by TEKES (The National Agency of Technology), MOTIVA (The Energy Saving Center), YM (The Ministry of Environment)

What kind of information do you get?
MOTIVA, publications, building service and building product suppliers, project and case descriptions

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
Yes. E.g. the statistics of The Association of Finnish Local and Regional Authorities, statistics of Ministry of Trade and Industry. Our city is one in the top of the statistics of Finnish Local and Regional Authorities.
See: http://www.kunnat.net/k_etusivu.asp?path=1;161;279, http://www.ktm.fi/?l=en

Where do you search for information?
— Research institutes
— Library (guidelines and books)
X Search engine (google etc.) Google
X Special web-sites (specify)

— Magazines, technical or others
X Associations: magazine, web-site, member bookstore
— Teaching materials, textbooks
— Conferences
X Courses
— Friends and business contacts

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
MOTIVA gives proper information, almost the only actor in the field

What kind of information do you need? (Priority)?
X energy savings potential
price, loans and other expenses
The possibility is interesting, prices, debts etc is the business of Real Estate Services Center. Our city is the model city of energy use – district heating one of the first in Finland, the connections density very high, production of district heating is effective counterpressure production. Fuel is peat – a national fuel, which is sensible. The energy saving activities in the side of public buildings is relatively good, even considering the climate conditions. Energy economy is relatively good.
The information and data bank should be divided by climate zones as point of comparison. It could be need for the reference file, based on building groups and country based portal. Comparison file. This should be free and public, easy to use. Passwords and payments could be a barrier, in some level.

Interviewee SF3:
Personal info
Male, aged around 50 years
Current position: Director, Real Estate Services, facility and construction management, city with a population of 35000
Since 2001
Previously: Same type of duties in the preceding organization (Technical office), in which the parts were: Maintenance unit, FM Unit, Cleaning service unit)
Recent refurbishment projects:
- Renovations + enlargements (if needed), mostly schools and nursery schools
- One school/ 1,5 year, one nursery school/year
- Indoor air quality problems are diversified problems, first surveys, and then actions. Yearly 250 000 – 500 000 € in use. Energy saving targets: Ventilation systems, energy-efficiency related repairs

Retrofit innovation, low energy solutions, general
Who have an overview of energy friendly solutions for buildings/retrofit projects?
Energy saving contract from the year 1986
Energy expert in the organization: One HVAC-expert specialized in this area
Energy audits have carried out – the whole building stock of the city (public buildings) has been audited.
The buildings are in monitoring system (partly manually)

What kind of low energy measures/solutions do you know about? Mention some.
We need entireties more than single measures
Single measures do not give good results
Payback time is long very often
Ventilation repairs for higher energy efficiency (see above)
Structures-heating systems-HVAC(Building services)

Do you have insides in the energy saving potentials of innovative technologies?
Where do you get this kind of information?
1. The experts in our own organization. They do collect information and the confidence in them is high inside the organization
2. Internet
3. MOTIVA (The Energy Saving Center of Finland) http://www.motiva.fi/en/

Barriers
Do you have a policy for choosing energy friendly solutions in projects?
Do you have procedure in your organization for selecting energy-efficient solutions?
No.

What is the main reason for choosing (not choosing) an energy conservation and/or renewable energy technology in your building?

1. The central fact is:
- lack of money, community economy, i.e. insufficient and limited possibilities
2. Life-cycle solutions:
- the age of use, durability, life
- life cycle costs
- comparison of LCC in solutions and selections
- start-up is a problem
- liquidity of tenants

Do you feel that you (or the decision maker) have enough insides in the energy saving potentials of innovative technologies?
Yes (see above)

Economy
Energy saving solutions often clime high investment cost one year, and the savings will show following years. Is this a problem to your budgets?
Budgeting problem occurs. Ho the communities do save? 1. To cut costs 2. No depreciations enough big in the rents

Who can decide on using economical more expensive investments if the have reasonable payback time according to energy savings? (Political decision or technical decision)
The decision is technical.

Do you know about any economical incitements for choosing an (innovative) low energy solution? (Loan, subsidy, potential reduced energy bills, others)
External incentives:
- MOTIVA
- Energy saving contracts
- Incentives through ministry of Trade and Industry

Internal incentives:
- lower costs
- the law for procurements causes problems – the best system can not be chosen in every possible case

Do you know where to get this kind of information?
Do you know sources of information?
Yes.

Is the investment cost or the full cost basis for the decision process?
What is the criterion for decision? Investment costs or overall costs?
Full costs/investment costs. The criterion for decision should be full costs – in practice investment costs is the criterion relatively often

If you could choose for your project solutions that potential will save a lot of money the coming 15 years, and cheep (investment) standard solutions, what would you choose? Why?
See above – the best solution is not available in every case or not possible to use. The use of quality competitions is also problematic.

Organisation
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
No.

Do you have networks etc. with other municipalities where you can discuss experience and knowledge on energy saving and/or innovative solutions?
No.

Who will have the main responsibility for a retrofit project?
X - Technical staff in the municipality
- building "owner" (major occupant)
- hired consultant
- other, specify
Our own organization has the principal responsibility

Who will have the main responsibility for choosing energy friendly solutions?
The Real Estate Service Center has the principal responsibility –
I.e. our organization (public utility, Business Company)

What kind of contracts do you normally use?
Mainly normal model or tender (bid). Main contractor - subcontractors

When is, to your opinion, the most important time in the project for discussing using an innovative solution?
The design phase – in the bid stage everything is more or less fixed.

And who will decide to do/not to do so? (Innovative energy conservation activity)
In general the executive level of Real Estate Services. No systematic actions.

What kind of information (about energy efficient solutions) would you like in this phase of the process?
A data bank with easy access

Do you think others in the project would need other kind of knowledge about these solutions in this phase?
Well performing examples

Information
Where do you normally search for information?
Own experts, partners, building service suppliers, MOTIVA, Internet.

How do you normally hear about energy efficient solutions today?
Internet, publications, consultants, MOTIVA (The Energy Saving Center), YM (The Ministry of Environment)

What kind of information do you get?
MOTIVA, publications, building service and building product suppliers

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
The usual sources in use: The Association of Finnish Local and Regional Authorities, energy statistics of Ministry of Trade and Industry. The whole building stock of the city (public buildings) has been audited (see above). Monitoring results: No target values for single buildings. Consumption monitoring is in use, consumptions are compared with national averages and the previous years of that particular building.

Where do you search for information?
—— Research institutes
—— Library (guidelines and books)
X Search engine (google etc.) Google
—— Special web-sites (specify)
—— Magazines, technical or others
X Associations: magazine, web-site, member bookstore
—— Teaching materials, textbooks
—— Conferences
X Courses
—— Friends and business contacts

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
MOTIVA-information is one good source

What kind of information do you need? (Priority)?
X energy savings potential
price, loans and other expenses

The problems of Operation and Maintenance manual (in Finland every building should have one):
There is supply from private sector – difficult to choose
Electronic operation and maintenance manual – too less solutions available
One pilot building – a case study of a nursery home (electronic O&M Manual)

Interviewee SF4:
Personal info
Male, age 60 years
Current position: Facility service centre at a City with a population of 60000 people. Facility Manager, responsible on the technical maintenance of the city owned buildings (facility management and maintenance)
Since 1.12.1979
Previously: Building form, development, head of technical office
Recent refurbishment projects:
1. Present projects: Hospitals. Modernization of hospitals (technical retrofitting) and operational changes (space arrangements)
2. Kindergartens (<30), retrofits 2 nursery homes/year. Aging problems, modernization

3. Moisture repairs (Kindergarten, schools, 2-3 buildings/year)
Primary reason for moisture damages and repairs is external moisture: Basements, flooding, storm water, ground water
Indoor Air quality and Thermal Comfort: 3-4 years ago we made IAQ-studies for all kindergartens and schools. Customer/user inquiries every 2nd year.
The indoor air quality is a problem in schools. IAQ is the most important factor – and, by the same, the most problematic factor.
Energy conservation:
Energy savings hunting 1980 (before MOTIVA, MOTIVA = The Energy Savings Center in Ministry of Trade and Industry)
In years 80-85 the average consumption was 75 kWh/m^3, in the beginning of 90`s the average consumption was 36 kWh/m^3. It was achieved by running and operational practices without investments.

- Reduction of energy consumption increased, on the other hand, indoor air quality problems (running times), which must be taken into consideration. The recent consumption is in the level 42 – 44 kWh/ m^3.
- We have people who are specialized in energy savings and performance of building services.
- the key issue is training

The energy conservation ONLY causes problems if other factors are not taken into consideration.
Problems: Old facilities, aisle/manway air supplies, ineffective ventilation systems
The room spaces are used more efficient than before – example: one building has 300 persons at 70`s, now 800 employees and users in the same building.
The mushrooming of PC`s: overheating problems, Efficient use of space causes CO_2 - problems
Before the renewing of ventilation system, one must check the space arrangements.
The full-scale renovation means heavy repairs, substitute spaces must be found etc.
Example: The renovation of a hospital. Energy consumption increased after the renovation. The reason: Ventilation fans rotated backwards. The point is that the operating personnel must "learn" their facility.
The whole gang must be motivated, get excited to the topic. The other point is the consumption monitoring, which is the base for these kinds of activities.
The school world: the size of the teaching groups varies, building services can not follow the changes – it lags. This is an every-day problem.
The city has 440 buildings, 1 400 000 m^3, from which 90 000 m^3 under systematic energy monitoring (all the public buildings are under monitoring). Until now the janitor follows manually – weekly. E.g. water meter: One week is too long period to detect leaks.
Once a month we will have energy report which will be loaded to energy monitoring system.
The communities can't use building automation systems. Our city did not take the control system in due course, we took just alarms.
At the moment part of the facilities have resources and automation system in use. One third (1/3) of the building stock can be monitored and operated from the control/operating room.
The stage of automation is increasing in the connection of retrofits. In year 1980 we had 70 janitors, now 15. We have emphasized and underlined the skills and know-how of the personnel.

Retrofit innovation, low energy solutions, general
Who has an overview of energy friendly solutions for buildings/retrofit projects?
We have an expert engineer of HVAC and electricity (building service engineer) and HVAC-technician

What kind of low energy measures/solutions do you know about? Mention some.
Real Estate Service Center will take care of the design of actual retrofits (building manager)
The Facility Service Center products services for RESC.
The vain energy losses will be digged out and will be extinguished. First we optimize the use of existing building service systems – we will use them by proper way. The zero investments are the best investments. We also control by building types, what are the good and what are the bad points. The worst cases will be audited by us. We have ordered energy audits for the buildings which have high consumptions compared with the normal level. The number of audited targets (done by outside consultants) is ten (10). We have not found any common or general topics for heat losses or increased consumptions. The result is in many cases the full-scale renovation. Normally our personnel have been on the right track.
The additional insulation of roofs (blown insulating material)
The repair of uncontrolled air leaks – tightening of wall- and window structures, restraining of draft
The renewing of water fittings
We have not proceeded on technical novelties and innovations without tests and experiments – in the investment stage we will have new technology and innovations, when building new or when renovating old – in these cases we will purchase new techniques.
On the other had – we have plunged as guinea pigs even for big and famous producers. They have introduced devices and systems which are at prototype phase – especially in 8=´s, when the new systems had teething problems. We want final goods.

Do you have insides in the energy saving potentials of innovative technologies?
We have bad experiences on "unfruit berries" – promised more than we have got in practice.

Where do you get this kind of information?
There is lot of information available, but the availability of proper information is in the key position.

- FM (Facilities management) – file, VTT, other research institutes – by VTT and research institutes the window is open to the whole world
- professional publications, MOTIVA, MOTIVA-training (MOTIVA = The Energy Saving Agency, Company controlled by Ministry of Trade and Industry)
- fairs and exhibitions

Barriers
Do you have a policy for choosing energy friendly solutions in projects?
Do you have procedure in your organization for selecting energy-efficient solutions?
Yes.

What is the main reason for choosing (not choosing) an energy conservation and/or renewable energy technology in your building?
Running costs, or better, life-cycle costs, financing as a limiting factor
The costs management is important
Sometimes we must make other type of solutions consciously
Renewable energy sources: 90 % of district heating energy, peat as fuel. In sparsely populated area also pellets are in use, we have good experiences on pellets. No use of ground heat.

Do you feel that you (or the decision maker) have enough insides in the energy saving potentials of innovative technologies?
Yes – we keep up with the times – we have readiness, but feet on the ground. Nothing is excluded, but we have a critical attitude.

Economy
Energy saving solutions often clime high investment cost one year, and the savings will show following years. Is this a problem to your budgets?
We should solve the life-cycle costs – minor rough and tumble about investment costs vs. running costs.
Sometimes there is confrontation and we must choose non-optimal solution.

Who can decide on using economical more expensive investments if the have reasonable payback time according to energy savings? (Political decision or technical decision)
The decision is always technical – IF we keep the financing frames given the politicians, we can not transcend our limits – boundary conditions.

Do you know about any economical incitements for choosing an (innovative) low energy solution? (Loan, subsidy, potential reduced energy bills, others)
Yes

Do you know where to get this kind of information?
Yes.

Is the investment cost or the full cost basis for the decision process?
full costs / investment costs. Considering the financing frames: Full costs – inside the boundary conditions. Life cycle costs.

If you could choose for your project solutions that will potential save a lot of money the coming 15 years, and cheep (investment) standard solutions, what would you choose? Why?
It is question about the financial and budget situation – in construction and operation stage we want to realize sustainable solutions.

Organisation
Do you have special/defined staffs that work with building retrofit projects? Size? (Number of employees)
Yes. Real Estate Service Center: 2 persons, The Facilities Service Center 25 persons, developers, supervisors and foremen: 5 persons, 25 + 5 = 30 in our own organization for renovation, the rest persons needed from contractors and building firms.

Do you have networks etc. with other municipalities where you can discuss experience and knowledge on energy saving and/or innovative solutions?
Yes.

Who will have the main responsibility for a retrofit project?
X Technical staff in the municipality
- building “owner” (major occupant)
- hired consultant
- other, specify

Who will have the main responsibility for choosing energy friendly solutions?
In the investment project the contractor unit has the responsibility – RESC (Real Estate Services Center is responsible for investments)

What kind of contracts do you normally use?
Based on competition – incentive wage agreement. The plans must be in such condition and level that we can arrange the call of tenders. Small project by our own work.

When is, to your opinion, the most important time in the project for discussing using a innovative solution?
It is the pre-design phase – later all the limiting factors and conditions are already fixed and locked.

And who will decide to do/not to do so?
Our experts in our organization with co-operation the other parties.

What kind of information (about energy efficient solutions) would you like in this phase of the process?
The practical experiences on reference buildings – where we have succeeded – best practice

Do you think others in the project would need other kind of knowledge about these solutions in this phase?
The economic efficiency – in the level of decision makers they live here and now. When we will invest, its effect is long lasting and we need edification and proper information.

Information
Where do you normally search for information?
First from the experts of our own organization first, then from consultants, experts, publications and own network

How do you normally hear about energy efficient solutions today?
Own experts, network, MOTIVA, Research Institutes

What kind of information do you get?
The quality and availability of information is improved through years, we don't see solutions which saves more than 100 % any more….. The information is more credible. The channels mentioned above – but we don't believe in manufacturers directly – must be critical

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
Yes, all of them, actively

Where do you search for information?

X Research institutes
— Library (guidelines and books)
— search engine (Google etc)
— Special web-sites (specify)
General files
X Magazines, technical or others
X Associations: magazine, web-site, member bookstore

—— Teaching materials, textbooks
—— Conferences
X Courses
X Friends and business contacts

We must keep our eyes and ears open – the background community of experts and professorionals

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
Scattered sources of information
The sector must be 360° - disturbance of salesmen……
What we would need is one main information channel – it is economical advantage
MOTIVA has not got that role yet
More public financing – still too much wrong solutions
In small communities the main part of public buildings managed by one building master – too much job for one person – he/she must rely on consultants and manufacturers and depends on them.

What kind of information do you need? (Priority)?
X energy savings potential
—— price, loans and other expenses

For the maintenance organization the energy efficiency is energy saving the main factor. Budgeting gives the limiting factors. The Facility Management organization should give and product proper information for the decision makers, who we can do things better. If the organization will succeed in this, the better we can have money from decision makers. Interactive process…..
The first task in this job was to map what we have, in what condition the buildings are and what we can do with the resources we have in our use. The next step is where we can invest.

Interviewee SF5:
Personal info
Male, age 55 - 60
Current position: Manager of Real Estate Services (Premises services)
Premises: 1 000 000 m², hospitals, kindergartens, 300 – 400 building lots, 1000 buildings
City: population 175 000.
Since 1995
Previously: Head of the construction management (in the city organization)
Recent refurbishment projects
Renovation of a market hall, sanitary college, nursery schools, theater, ice stadium-parking hall (these are carried out during 2003-2004 and are ESCO-projects, i.e. energy related projects), numerous schools (plumbing and pipelines renovations)
The reason for retrofitting: Changes of use, security topics (Theater), ventilation (Market hall), energy savings in the main role in the market hall. The new partition of the space (Sanitary College) In other big projects energy savings are the side-result, even the projects are ESCO-projects.
Indoor Air problems vs. Energy savings – energy conservation must not go too far. Not "at any price" – type solutions. The city has approached the saving limits set by Ministry of Trade and Industry.

The Real Estate Services has created different expert groups, including experts from many units and also from outside – contractors, consultants etc. These groups – indoor air quality group, building automation group as a discussion forum and information exchange platform – do interdisciplinary co-operation over the different parts of administration. An example of the results: Moisture and healthy problems in buildings - rating list for the order of importance, priority order for renovations set by the groups. Lot of bad indoor air quality and ventilation problems, the reason could be even air leaks through foundations, in which there are old building material wastes causing microbes
Remote control covers 20 – 30 % of the built volume.
The biggest facilities have been connected as first. Energy audit (MOTIVA-procedure) has been done for 70 % of the building stock which, in general, is worth of auditing. The city has lot of old buildings (the city is the oldest city in the country), the desired values of energy consumption are varying within a wide range.

Retrofit innovation, low energy solutions, general
Who has an overview of energy friendly solutions for buildings/retrofit projects?
ESCO-targets have been engaged with ESCO-contracts. We have used consultants. Five (5) employees in HVAC-sector, one person focused on energy related topics. The first energy saving contract was made 10 years ago – the initiative came from private side, from a building company with financing offer. At the moment there is competition between firms. The law from private purchases on the other hand helps the situation; on the other hand the law is a disadvantage for innovative solutions in some cases. Real Estate Services – and the other part. Production Services have also experience on this.

What kind of low energy measures/solutions do you know about? Mention some.
The various applications of heat recovery, the reclamation of condensation heat from refrigerating machines in pre-heating of incoming air supply
Heat Recovery in general (in ventilation applications), air heat pumps
The balancing of radiator heating network – this must be done after each renovation measures (e.g. after the change of windows, after installation of additional insulation etc.)
The modernization of water fittings

Do you have insides in the energy saving potentials of innovative technologies?
Water fittings – the instrumentation can be extended to the liter level with very short periods of measuring – so the leaks can be located very quickly. Ground heat pumps – the city have not used ground heat pumps and have information about the heat pumps. The district cooling systems is now under construction (There are also that kind of installations in some other cities). The district cooling system can utilize the waste energy from waste water treatment plant. One detail is special smoke detectors, which are trimmed only for normal combustion gases. This originally machinery plant application seemed to be useful in some special buildings (not directly energy saving measure) and prevents false alarms.

Where do you get this kind of information?
There is lot of information available from various sources

Barriers
Do you have a policy for choosing energy friendly solutions in projects?
Yes.

What is the main reason for choosing (not choosing) an energy conservation and/or renewable energy technology in your building?
Best possible energy efficiency
The costs are also an important factor.
Our own network and groups (building automation group, indoor air group) can gain good ideas and various options.

Do you feel that you (or the decision maker) have enough insides in the energy saving potentials of innovative technologies?
Yes – our own network and our organization with good experts.

Economy
Energy saving solutions often clime high investment cost one year, and the savings will show following years. Is this a problem to your budgets?
If we will use ESCO-concept, it does not cause any problems.

Who can decide on using economical more expensive investments if the have reasonable payback time according to energy savings? (Political decision or technical decision)
The final decision is made by estates board which is under the city council, so it is a political body. But the technical organization does the technical planning and the preparation and its proposals and reasons have never knocked-out.

Do you know about any economical incitements for choosing an (innovative) low energy solution? (Loan, subsidy, potential reduced energy bills, others)
Yes – we have examples of ESCOs, There is a possibility to get 20 % energy saving support from Ministry of Trade and Industry and use the support of local TE agencies (TE= Employment and Economic Development Centers) which are units of Ministry of Trade and Industry. We have also used the financial support for energy audits (MOTIVA-support). The most important thing is that there would be information available also for smaller communities, which does not know so much about these different forms of support. So, "one door" information bus would be good. If some form of support will remain not to use, it means that there is no energy conservation. This goes for the community and society, so the information about the energy saving support forms should be as good as possible. In small communities there is only one person in many cases responsible on the facilities and he/she has not time enough to pay attention to various sources of information.

Do you know where to get this kind of information?
Yes.

Is the investment cost or the full cost basis for the decision process?
full costs / investment costs. Both costs are important in the decision process, but the decision should be done based on full costs.

If you could choose for your project solutions that will potential save a lot of money the coming 15 years, and cheep (investment) standard solutions, what would you choose? Why?
Optimized life-cycle costs are the basis for selecting.

Organization
Do you have special/defined staffs that work with building retrofit projects? Size? (Number of employees)
Yes. 5 persons in HVAC-department

Do you have networks etc. with other municipalities where you can discuss experience and knowledge on energy saving and/or innovative solutions?
Yes.

Who will have the main responsibility for a retrofit project?
X Technical staff in the municipality
- building "owner" (major occupant)
X - hired consultant
X - other, specify ESCO-contractor – this is a co-operation

Who will have the main responsibility for choosing energy friendly solutions?
In ESCO-projects the ESCO-contracts has the main responsibility – this solution uses both partners.

What kind of contracts do you normally use?
In energy renovations ESCO-contract, in new building main contracts + subcontracts, in some level we use unit price contracts (ventilation repairs)

When is, to your opinion, the most important time in the project for discussing using an innovative solution?
It is the pre-design and project planning phase – later the details are more or less already fixed and locked. There is one point which must be taken into account in very early stage: Usability and serviceability + maintainability. The maintenance personnel must have easy access to the units, e.g. to ventilation units etc.

And who will decide to do/not to do so?
Our experts in the organization with co-operation by partners. One good practice is our building automation and indoor air working groups. 15-20 persons from different parts will generate ideas (best practices). Because many partners are represented in the group, the critics and newspaper articles have decreased. People involved in this process do understand the situation and conditions better. We have gone step by step into a good direction. Orderliness is increased, and we try to solve the big problems as first. The flexibility of the space and convertibility and change of use is one important issue. We have an example of extremely long brought flexible solution – office, rented object – and the additional costs of flexibility were 12 %.

What kind of information (about energy efficient solutions) would you like in this phase of the process?
As versatile and all-round type information as possible

Do you think others in the project would need other kind of knowledge about these solutions in this phase?
Pay back time, total costs, the portion of financed by the city if there is supporting funding available, profitability analysis (discounting, present value method is very useful). Also quality matters are important. What kind of service quality the customer wants? As an example: What temperature difference in vertical position is available? What are the limits for temperature fluctuations? The customer demands are not so well specified in some cases. This is a subject which should be highlighted. The specification of demands.
The different parts of building process are sitting separated from each other, so more dialog is needed in the design phase (contractors – HVAC-designers, Automation Guys etc)

Information
Where do you normally search for information?
Reference projects in our town, in our country and in other countries, from contractors, other cities, private partners, designers

How do you normally hear about energy efficient solutions today?
By our own network

What kind of information do you get?
Technical solutions, energy saving potential

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
Yes, the statistics and comparisons published by Kuntaliitto (The Association of Finnish Local and Regional Authorities), the monitoring results from our own building stock.

Where do you search for information?
- X Research institutes
- X Library (guidelines and books)
- — search engine (Google etc)
- — Special web-sites (specify)
- General files
- Magazines, technical or others
- X Associations: magazine, web-site, member bookstore
- X Teaching materials, textbooks
- X Conferences
- X Courses
- Friends and business contacts

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
No problems to be updated – our working groups, e.g. building automation working group with 15 members is a good platform – somebody puts always out current ongoing topics
These working groups is a good means and resource – then we have a continuous consumption monitoring and benchmarking, which is a good tool

What kind of information do you need? (Priority)?
- X energy savings potential
- X price, loans and other expenses

Both cases are important – energy efficiency as a technical base but the costs and prices are the other factor.

Interviewee SF6:
Personal info
Male, age 55 - 60
Current position: Deputy manager at a real estate investment company listed on the Helsinki Stock Exchange specializing in office and business premises. Premises: 850000 m², offices, commercial and logistical properties. Duties: Export to Russia and Baltic countries, real estate fund

Since 2005
Previously: Development activities and building development, 24 years
Recent refurbishment projects:
Wide range: One example: Apartment house built in 30`s, changed to the offices in 50`s. Building services totally renewed, new windows, additional external insulation. It has been also a pilot study: Distributed building services and decentralized ventilation installations. Every floor has its own device. This technology can be applied also for health centers and hospitals, in which there may be room spaces in varying use. By using decentralized ventilation needless energy consumption can be avoided.
Big commercial building: Old VAC-techniques remains (high pressure technique) but the system will be automatized, all windows has been changed to gas-filled ones with a payback time 3,5 – 4 years. More convenient thermal comfort for indoor work, less radiation, less street noise. Also a new heat recovery system is going to be build, also distributed systems. There are shops, restaurants etc working 16 hrs a day and varying business hours and varying functions, so distributed and decentralized techniques in ventilation must be used.
In general: Heat recovery systems have been installed, examples also of ESCO-projects (in co-operation with MOTIVA, realized 1999-2000). Retail trade shop, heat recovery installed for condensate heat of refrigerating machines.

Retrofit innovation, low energy solutions, general
Who has an overview of energy friendly solutions for buildings/retrofit projects?
Monitoring of the building stock since 1982. Based on the results we evaluate the optimum consumption for each object. A consulting company takes care of the internet-based online-monitoring, the meters are electronically readable. The beginning for the system was like this: In one building the ventilation fans ran continuously more than a year – after this an alarm system was planned. Water is especially important – there are every now and then peaks of water consumption. The scale varies from carelessness (somebody has left the tap open) to leaks and even misuse (water has been stolen). The role of insurance companies could be more on view, e.g. a system which automatically would shut down the main water supply valve if the consumption would exceed some limit which has been set in advance. By this way the possible damages could be stopped immediately, the other point how to cerate the system in case of fire alarm etc.

What kind of low energy measures/solutions do you know about? Mention some.
The running times and the optimization of them; the utilization of free heating; i.e. non-investments; structures see below:
Building envelopes: Additional insulation and prevention of air leaks, a proper way of construction, optimum cost level

Do you have insides in the energy saving potentials of innovative technologies?
Decentralized ventilation systems, ESCO-solutions (see above)

Where do you get this kind of information?
There is lot of information available from different sources. Because the line of our business is properties, the organization must have experts in this branch, too. It is one base for the activities.

Barriers
Do you have a policy for choosing energy friendly solutions in projects?
No. The answer means that we can not have any actual direct procedure in general. Every building and target must be studied separately; what type of investments we may need and the

calculation model for the achieved savings. No general specifications, because we have different type of buildings and various purposes of use.
An example of logistical buildings: The user will pay the bills – so its is reasonable to arrange proper sluice doors and control the temperature to reasonable level, taking the working temperatures into consideration – in harbor storages where the workers go in and out, the temperature level is kept relatively low if possible.

What is the main reason for choosing (not choosing) an energy conservation and/or renewable energy technology in your building?
Heating: Riddance from individual heating systems, change to district heating. Also district cooling is coming more and more actual.
Electric power to buy is under competition.

Do you feel that you (or the decision maker) have enough insides in the energy saving potentials of innovative technologies?
Yes – we must ask for the right persons. Our organization itself must think and evaluate things.

Economy
Energy saving solutions often clime high investment cost one year, and the savings will show following years. Is this a problem to your budgets?
This is not a problem. In general we prefer life-cycle costs method. Sometimes there is conflict between building company and owner. The owner can see the things by different way…..

Who can decide on using economical more expensive investments if the have reasonable payback time according to energy savings? (Political decision or technical decision)
The development manager in the company has the power of decision – this differs from the public side. The process of decision making is easier. On the other hand, we can see many examples of failed projects in the public side. There have been arranged architectural competitions dealing with libraries and nursery homes. The allocated funding is fixed. The entries can include details, which cause extra costs, and what is most important for energy efficiency is building physics. These solutions and details can consist in-built problems – details which may cause lowered thermal comfort, thermal bridges etc. The final result is more expensive than planned and have some problems. The reason is lack of knowledge in building physics…..

Do you know about any economical incitements for choosing an (innovative) low energy solution? (Loan, subsidy, potential reduced energy bills, others)
We have been informed about incitements. MOTIVA-supports have been used. A big company has problems to get this support.

Do you know where to get this kind of information?
Yes.

Is the investment cost or the full cost basis for the decision process?
full costs / investment costs. We must check the investment costs first, but life-cycle cost comes beside.

If you could choose for your project solutions that will potential save a lot of money the coming 15 years, and cheep (investment) standard solutions, what would you choose? Why?
Energy savings and the saving potential is the crucial issue – calculated by LCC.

Organization
Do you have special/defined staffs that work with building retrofit projects? Size? (Number of employees)
Yes. We have 1+3 employees in the repair- and maintenance sector.

Do you have networks etc. with other municipalities where you can discuss experience and knowledge on energy saving and/or innovative solutions?
Yes, we have consulting firm in monitoring and also other partners – a network of experts

Who will have the main responsibility for a retrofit project?
- Technical staff in the municipality
- X - building "owner" (major occupant)
- hired consultant
- other, specify

Who will have the main responsibility for choosing energy friendly solutions?
Building owner/main user (The real estate investment company)

What kind of contracts do you normally use?
Lump-sum contracts in general, but also other type of contracts like target price contracts – one example are shopping malls. In these cases the plans are living and changing to the last moments – e.g. the tenants are not fixed in the first stage, in many cases the tenants = the retail shops differs from each other. Pet shop specialized in reptiles needs totally different lighting and thermal conditions than a luxury fur shop. The layout is fixed at the last moment – under the main solutions there must be possible to flexibility and distributed and decentralized systems are preferred. Also the form of contract must be flexible. So, the solutions are depending on the premises.

When is, to your opinion, the most important time in the project for discussing using an innovative solution?
It is the pre-design phase: It is the stage when we set the goals. The problem is that the customer has no clear vision about the goals (energy efficiency etc.). The program for the goals should be achieved as soon as possible. One recommended way to visualize and illustrate the goals (building services and HVAC-technique) could be animated software in which
- The display and scene from the rooms
- illustrated air flows and temperatures
- The effect of various factors: How the changes (set of parameters) will effect to IAQ, thermal comfort and conditions
- To this presentation should be added:
- How the running costs are changing if the settings are changing
- How the quality parameters are changing if the settings are changing
- How the different factors affects to the level of rent (i.e. how the changes affects to the costs distribution)
- How the change of quality level affects to the level of rent
- How these changes affect to LCC (life-cycle costs)

So, for the building owner is very important, that one could visualize to the customer how different factors affect to the final result and to the level of rent. To combine the technical parameters to economical calculations would give good information to the customer, if the software package could be run in PC – the representative of building owner could show easily and by illustrative way. This kind of product would be very useful.

And who will decide to do/not to do so?
Building owner/user – see the previous questions

What kind of information (about energy efficient solutions) would you like in this phase of the process?
The previous example about the illustrated costs and investment software. Energy prices and use of energy is not so important.

Do you think others in the project would need other kind of knowledge about these solutions in this phase?
There is information enough available. From the point of view of real estate investment company the question is: How to choose the proper information – the main line of business is to own and develop properties which means that the organization must have professionals who will choose the source based on which one can go forward. Also the use of the building will determine the solutions. In retrofitting there are many simple ways to gain savings: Changing lamps to low-energy lamps pays it by lower electricity costs in few years. That measure should be possible (as an example) in all cases where needed.

Information
Where do you normally search for information?
As mentioned above, there are many sources of information. Inside the enterprise there is a continuous and daily acquisition of information and also the company uses the existing co-operation network.

How do you normally hear about energy efficient solutions today?
Trade journals (mainly)

What kind of information do you get?
From the monitored data, best practice-cases, reference targets

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
Yes

Where do you search for information?

X	Research institutes
	Library (guidelines and books)
—	search engine (Google etc)
—	Special web-sites (specify)
	General files
X	Magazines, technical or others
	Associations: magazine, web-site, member bookstore
	Teaching materials, textbooks
	Conferences
	Courses

X Friends and business contacts

Business contacts – the partnership network is the most important source of information

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?

Actually there is no problems to be updated – there is information enough

What kind of information do you need? (Priority)?

X energy savings potential

X price, loans and other expenses

Cost-awareness is the starting point; the alternatives of technical solutions will be made based on the cost-awareness.

In many cases we can find relatively simple solutions, like in old apartment buildings were new technology has been applied in old natural ventilation system – smart filters and thermostats for air supplies. We must remember that innovations have appeared through centuries – one example is (ventilation) the Arabian wind tower which can work relatively sufficiently…..

Interviewee SF7:

Personal info

Current position: Programme manager in business development (coordination). Strategic management, including strategy implementation in projects and control process for social responsibility

Since 2002 (continuous career within the same employer with reorganization since 1984)

Previously: Since 1975 similar occupation.

Recent refurbishment projects:

Refurbishment is quite busy with frequent projects outnumbering new construction. Refurbishments include both repairs projects and energy improvements.

The former state authority organization has been transformed into business unit, thereby the refurbishments are based on customer demand.

Energy economics is based on public commitments (including Kyoto treaty).

Retrofit innovation, low energy solutions, general

Who has an overview of energy friendly solutions for buildings/retrofit projects?

The interviewee through societal responsibilities; and the project managers within their refurbishment projects. Common aspects (i.e. principle of using centralized heat energy supply when available) are implemented trough process control interaction in investments.

What kind of low energy measures/solutions do you know about? Mention some.

Sources are ample, including participation to research projects run by research institutes. Therefore there is a rather vide and timely knowledge about available options.

As Senaatti (Senate Estates) is a major business unit, the contacts are actively taken by those parties, who have business initiative to push their solutions into use: the providers get a reference value if they succeed.

There is an active seek for novel solutions in development projects.

Do you have experiences in the energy saving potentials of innovative technologies?

Where do you get this kind of information?

Through involvement in research projects and implemented projects.

Barriers
Do you have a policy for choosing energy friendly solutions in projects?
Yes. In every project, the systematic for ecological construction management is included since project planning until occupancy.

What is the main reason for choosing (not choosing) an energy conservation and/or renewable energy technology in your building?
The main reasons for the choosing of energy conservation and renewable energy are frequently the costs but also the environmental impacts. The client has an impact on selections. The choice renewable energy is systematically studied and it is a realistic actual option.

Do you feel that you (or the decision maker) have enough insights in the energy saving potentials of innovative technologies?
Yes, as a main rule things are OK: only incidental problems, usually no lack of information.

Economy
Energy saving solutions often show up as high investment cost one year, and the savings will show in the following years. Is this a problem to your budgets?
Sometimes yes.

Who can decide on using economical more expensive investments if the have reasonable payback time according to energy savings? (Political decision or technical decision)
The decision is technical, not political. The project manager has the key role.

Do you know about any economical incitements for choosing an (innovative) low energy solution?
(Loan, subsidy, potential reduced energy bills, others)
These are hardly available, self sufficiency is required. Own incentives are the reward.

Do you know where to get this kind of information?
Yes. They are known alright, but not applicable.

Is the investment cost or the full cost basis for the decision process?
What is the criterion for decision? Investment costs or overall costs?
Investment costs. Investment cost is the first to be solved, but the life cycle costs are viewed as well.

If you could choose for your project solutions that will potential will save a lot of money the coming 15 years, and cheep (investment) standard solutions, what would you choose? Why?
The client makes agreements for 3, 5 or 15 years, and the initial situation has to be tempting. The decision is not on/off choice, is rather a consensus.

Organisation
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
Yes: 60. The staff is largely contracted out. Numerous consultants are involves, many of them are long term partners. The inhouse practice is insisted from consultants.

Do you have external (outside own business) networks where you can discuss experience and knowledge on energy saving and/or innovative solutions?
Yes. In maintenance with service providers, hardly with construction contractors.

Who will have the main responsibility for a retrofit project?
Technical staff in the municipality
building "owner" (major occupant)
hired consultant
other, specify
Senaatti by itself. Small number of consultants is involved, but hardly to actually carry responsibility. To both the Ministry of Finances and the clients Senaatti is responsible.
Who will have the main responsibility for choosing energy friendly solutions?
Senaatti, except for electricity bills (client).

What kind of contracts do you normally use?
Traditional contracting with main and sub contractors with some experimenting of other forms.

When is, to your opinion, the most important time in the project for discussing using an innovative solution?
In large scale projects, life cycle consultants in the beginning of the project.

Who will decide to do/not to do so? (Innovative energy conservation activity)
Mostly Senaatti or the consultant, sometimes knowledgeable client, or a client of an energy intensive project.

What kind of information (about energy efficient solutions) would you like in this phase of the process?
Numerical information is the best, verbal explanations remain too vague. Economic arguments are good, often the emission information too (with increasing emphasis).

Do you think others in the project would need other kind of knowledge about these solutions in this phase?
Numerical information, verbal has hardly value.

Information
Where do you normally search for information?
From the internet (Motiva+links, KTM+links, RAKLI+links, RTS: KH, RT, LVI infocards)

How do you normally hear about energy efficient solutions today?
From professional journals, participation in research projects, from consultants

What kind of information do you get?
Real projects (frequently with a link to participants) and new options for consideration, contact info.

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
Seldom self; but the consultants do frequently.

Where do you search for information?

2 Research institutes
Library (guidelines and books)
1 Search engine (google etc.) Google
Special websites (specify)
Magazines, technical or others
Associations: magazine, website, member bookstore
Teaching materials, textbooks
3 Conferences
Courses
Friends and business contacts

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
Fairly easy. Anybody interested finds several types of various information for the needs.

What kind of information do you need? (Priority)?
1 energy savings potential
2 price, loans and other expenses
It is hard to influence the market price of energy, but energy efficacy can be influenced.

7.4.4 Germany

Interviewee D1:

1. The interviewed person and his/her role:

a) Male/female? Male

b) Age? 42

c) What is your position in the organisation, and what is your function? Energy Manager for a major German city, Department of Environmental Protection. Responsible for the reduction of the energy consumptions and the energy related costs of the municipal buildings

2. Retrofit innovation, low energy solutions, general

a) What kind of solutions do you think of as innovative energy saving and renewable energy technologies?

(alternatives, help for the interviewer, mark with "X")

Innovative insulation X
High – efficient windows X
Hybrid ventilation
Improved day lighting X
Absorption cooling (solar assistant cooling)
Reduce of overheating, using building mass and shading (passive)
Heat pumps X
Solar thermal collectors X
Passive Solar gains
PV-integration X
LCA
Others: specify

answers were grouped as follows:

- measures to reduce the consumption:
  - insulation
  - reduction of the technical equipment such as lighting and ventilation
- high-efficient technology: ventilation (heat recovery), lighting
- renewable energy technologies:
  - wood as fuel
  - solar/thermal
  - PV
  - heat pumps

b) Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?

interviewed person himself

c) Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?

yes: Energieerlaß der Stadt = energy decree of the city, includes lower maximal energy demands than the national limits, the commandment to use condensing boilers and the requirement to check if solar energy technologies are applicable

d) If you apply some of these technologies, which ones?
the standards mentioned in c) have to be applied always
additional measures are applied if economically efficient

e) What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?
pro: Energieerlaß = energy decree
economy-efficiency
contra: economy-inefficiency
monument protection
architecture

H2 - Economy
3.a) Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
sometimes yes, solution: intracting = city internal contracting
additionally they have sensitised the decision makers in the city administration

b) Are the investment costs or the total lifecycle cost basis for the decision process?
total lifecycle costs as long as the investment costs can be included into the budget

c) Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
political decision: Gemeinderat=district council will decide if there is a clash between the environmental department and the planning department

d) Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
intracting = city internal contracting
kommunaler Leitzins = lower loan for cities, was not necessary in Stuttgart until now
PV-feed into the grid supported by the German regulation on renewable energies

e) Do you know where to get this kind of information?
yes, they support those actions themselves (intracting)

H3 – Organisation
4.a) Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
yes. 10 employees

b) Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
administrative department of the city (financially)
planning department of the city (planning + realisation)

c) When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
at the creation of the project idea, before any number is calculated

d) Who will have the main responsibility for choosing energy friendly solutions?
department of environmental protection

e) Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
Städtetag = association of German cities and towns
Energie cités
CEMR -> European association of cities and towns

f) The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)
dependent on the type of contract:
in competitions: VOF for consultancies by architects and engineers
otherwise: VOB/VOL

H1 -Information
5.a) How do you normally hear about innovative energy saving and renewable energy technologies?
in the mentioned associations of 4e)
technical journals
congresses

b) What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc)
all of the above mentioned

c) Where do you normally search for information?
- Research institutes
- Library (guidelines and books)
- Google
- Special web-sites (specify)
- Magazines, technical or others
  - Associations: magazine, web-site, member bookstore
  - Teaching materials, textbooks
  - Conferenses
  - Courses
  - Friends and business contacts
  - Colleagues

see 5a)

d) What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?
(general info on technologies, saving potential, economical incitements, guidelines, calculation tools etc.)
New technologies, saving potential

e) Other people in the project organisation (see below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)

1 Project leader, your organisation (planning department)
4 Technical staff, in your organisation general
2 Building owner
5 Technical support staff in building (caretaker), other maintenance staff
3 Building user, leader (principle etc.), general user (teacher, employees)
6 Public administrator networks
Technical Consultants
Building contractor

f) What kind of information do they need? (read to the respondent) (prioritise, and specify who)

20 % Energy saving potential
Statistics
Cost, loans and other incitements
50 % Cost – benefit, economy (investments, savings, maintenance)
Short information, overview
Principle sketches
Designing information
Calculation advice
30 % Knowledge about possibilities

g) Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
They produce annually the energy report for the city of Stuttgart including information and statistics on the energy consumption of all municipal buildings

h) Do you have information about the energy saving potentials of innovative technologies?
yes: energy report of the city, the associations mentioned above, posters produced by them

i) If yes, is this information available? Where? (Which source)
reports and information available at their website: www.stuttgart.de/energie

j) Do you know about guidelines on innovative energy saving and renewable energy technologies?
energy decree of the city, additional ones by the association of German cities and towns and the federal state of Baden-Wuerttemberg

k) If yes: How do you get these guidelines? by demand or networks

X Web-pages, free (examples?)
X Subscriptions, (by post), what kind? technical journals
X Subscription, internet based versions newsletters like enev-online, VDI
Call on demand – infocentre, etc (where?)
Publisher. Bookstore, institute, institute sales office? few
Others?

l) What are the barriers for not know/get this guidelines:

Don't know where to search (same as answer don't know about any webpage)
Too expensive
don't know about any web-page
don't have subscription /not member,
too expensive subscription
X others: time-consuming

m) Where would you normally search for guidelines in general?
see 5.k)

n) How can we best give you and others information and help on innovative energy saving and renewable energy technologies?
e-mail newsletter

6) Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
no, they are very close to this information
Main problem (if) is the limited time.

Interviewee D2:

1. The interviewed person and his/her role:
Male/female? Male
Age? 39 Years
What is your position in the organisation, and what is your function? (HVAC)-Project director performance contracting

2. Retrofit innovation, low energy solutions, general
What kind of solutions do you think of as innovative energy saving and renewable energy technologies?
Heat pump coupled earth pipes, thermoactive ceilings, double skin facades, absorption cillers, H_2-mircroturbine

Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?
Me and most of my colleagues

Do you have a policy for applying these kinds of solutions, or do you use more standard guidelines/solutions?
Policy is minimizing life time costs and looking for added values

If you apply some of these technologies, which ones?
Hybrid ventilations, double skin facades, radiant cooling, absorption chiller, CHP units, earth heat exchanger, PV glas facades

What is the main reason for choosing (or not choosing) an innovative energy saving and renewable energy technologies in your building projects?
Life time costs and added values, representative elements

H2 - Economy
Energy saving solutions often requires a high investment cost in the first year, with financial savings in the following years. Is this a problem for your budgets? (If yes, do you have any ideas for a solution?)
No, because we calculate in life time costs

Are the investment costs or the total lifecycle cost a basis for the decision process?
See before

Who can decide on using more expensive investments if they have reasonable and justifiable payback time according to energy savings? (Political decision, technical decision, others).
As already said, we only decide on lifetime costs. The budget in my company will be fixed generally by my directory board, based on my advice

Do you know about any financial incentives for choosing innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
That´s my job, yes.

Do you know where to get this kind of information from?
Yes, my information network is fine.

H3 – Organisation
Do you have special or defined staff that work on building retrofit projects, is so how many employees?
Yes, we generelly have competence centers in my company, not only for retrofit projects, also for PPP Project financing, etc.

Who will have the main responsibility for a retrofit project? (Technical staff in your organisation, building "owner" [principal, priest, nursing home manager] or a hired consultant).
That depends on the project status. In the acqusition phase, me and my colleagues, in the realisation phase the construction department and in the later phase the facility management colleagues

When, in your opinion, is the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
In the acquisition/preparation phase

Who will have the main responsibility and final decision for choosing energy friendly solutions?
The decision makers (building owner, investor, building manager, real estate manager)

Do you have networks or knowledge groups with other municipalities/universities/ organisations where you can discuss experience gained and knowledge available on innovative energy saving and renewable energy technologies?
We gain from close cooperations with research institutes and finance experts. Our company policy is to cooperate in many ways on international level

The type of contract used in the project can impact on the decision process for the use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country).
Very different kinds. That depends on the client. We have no preference, we serve on demand

H1 -Information
How do you normally hear about innovative energy saving and renewable energy technologies?
Project groups, journals, conferences, company and personal networks

What kind of information do you receive? (advertisement, magazines, guidelines, statistics, newsletters etc).
I get what I want/look for, don´t understand this question.

Where do you normally search for information? X means yes
- X Research institutes
- Library (guidelines and books)
- X Google and other search engines
- X Special web-sites (specify)
- X Magazines, technical publications, other publications
- X Professional associations/intuitions: magazine, web-site, members' bookstore
- Teaching materials, textbooks
- X Conferences
- Courses
- X Friends and business contacts
- X Colleagues

What kind of information about innovative energy saving and renewable energy technologies would you like available in the decision making phase of the project?
(general info on technologies, saving potential, economical incentives and implications, guidelines, calculation tools etc.) General, saving (energy and cost) potential, reliability, references

Other people in the project organisation (list below) may need other types of information about innovative energy saving and renewable energy technologies. Who are, to your opinion, the most important to supply information to? (number in order of priority)
There is no priority but information content/level may differ
- Project leader, your organisation
- Technical staff, in your organisation general
- Building owner
- Technical support staff in building (caretaker), other maintenance staff
- Building user, leader (principle etc.), general user (teacher, employees)
- Public administrator networks
- Technical Consultants
- Building contractor

What kind of information do they need? (read to the interviewee, prioritise, and specify who)
- General info on technologies - knowledge about possibilities, statistics All
  - Energy saving potential All
  - Economic incentives and implications - capital cost, loans, financing, incentives,

benefits, financial savings (investments, savings, maintenance) Finance administrations, building owners/investors, real estate managers and other decision makers
Guidelines - overview of technologies, short information, principle sketches, design information (technical investor staff and architects)
Calculation advice (technical contractor staff)

Do you use any kind of energy statistics, energy reports or news magazine about innovative energy saving and renewable energy solutions?
No special issues but as mentioned before different information channels

Do you have information about the energy saving potentials of innovative technologies? If yes, from what source?
Boring question, did answer this twice already before

Do you know about guidelines on innovative energy saving and renewable energy technologies?
Again (question was boring for him as well, because he answered this severeal times before)

If yes: How do you get these guidelines?
Web-pages, free (examples)
Subscriptions by post
Subscription, internet based (what kind, where from)
Call and demand – infocentre, etc (what kind, where from)
Publishers, bookstores, institutes
Others

What are the barriers for not knowing about or obtaining these guidelines:
Don't know where to search
Too expensive
Don't know about any web-page
Don't have subscription /not member,
Too expensive to subscribe
Others

Where would you normally search for guidelines in general?
Explained before, next question please

How can we best give you and others information and help on innovative energy saving and renewable energy technologies?
Offer on participation in national/international research projects, internet newsletter service, personal networks, multidisciplinary expert roundtable information exchange, (only for your information: it is our advantage to be better informed than our concurrence, so I can give you no advice for a broad information distribution system)

Do you think it is hard to be updated on energy efficient solutions and if so, what is the main reason why you do not have up-to-date knowledge/information?
I believe I have up to date information, but it is time consuming to develop and maintain a high efficient personal information network

Good luck with your project, I was honoured to give my practicle view into this interview campaign and hope to continue our information exchange

Interviewee D3:

1. The interviewed person and his/her role:

a) Male/female? Female

b) Age? 49

c) What is your position in the organisation, and what is your function? Project manager for the planning and surveying department of a major German city

2. Retrofit innovation, low energy solutions, general

a) What kind of solutions do you think of as innovative energy saving and renewable energy technologies?

(alternatives, help for the interviewer, mark with "X")
Innovative insulation X
High – efficient windows X
Hybrid ventilation
Improved day lighting X
Absorption cooling (solar assistant cooling)
Reduce of overheating, using building mass and shading (passive) X
Heat pumps
Solar thermal collectors X
Passive Solar gains
PV-integration X
LCA
Others: specify

b) Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?

building physicist and heating system planners of the department, the department of environmental protection

c) Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?

yes: energy decree of the city includes lower maximal energy demands than the national limits, investigation on condensing boilers and solar energy technologies

d) If you apply some of these technologies, which ones?

the standards mentioned in c) have to be applied nearly always

e) What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?

pro: energy decree
economical efficiency

contra: economical inefficiency
monument protection
architecture
reliability

H2 - Economy

3.a) Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
yes, we plan with investment costs mostly.

b) Are the investment costs or the total lifecycle cost basis for the decision process?
most important: the investment costs can be included into the budget, total life cycle costs are regarded as a secondary decision basis

c) Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
political decision: district council
planning department with advice by the environmental department

d) Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
city internal contracting
lower loan for cities, was not necessary in Stuttgart until now
PV-feed into the grid supported by the German regulation on renewable energies

e) Do you know where to get this kind of information?
yes, its's part of my job

H3 – Organisation

4.a) Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
yes. ~ 30 employees

b) Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
financially: administrative department of the city
planning + realisation: planning department of the city

c) When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
at the creation of the project idea, and during the design phase to see if the idea can be really incorporated

d) Who will have the main responsibility for choosing energy friendly solutions?
department of environmental protection, architects, engineers

e) Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
Städtetag = association of German cities and towns

f) The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies.

What kind of contracts do you normally use? (leave out if you only have one alternative for your country)
in competitions: VOF for consultancies by architects and engineers
otherwise: VOB/VOL

H1 -Information
5.a) How do you normally hear about innovative energy saving and renewable energy technologies?
in the mentioned associations of 4e)
technical journals

b) What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc)
advertisements, magazines

c) Where do you normally search for information?
Research institutes X
Library (guidelines and books) X
Google
Special web-sites (specify)
Magazines, technical or others X
Associations: magazine, web-site, member bookstore
Teaching materials, textbooks
Conferences
Courses
Friends and business contacts
Colleagues X

d) What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?
(general info on technologies, saving potential, economical incitements, guidelines, calculation tools etc.)
General information, new technologies, saving potential

e) Other people in the project organisation (see below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)
1 Project leader, your organisation (planning department)
4 Technical staff, in your organisation general
5 Building owner
2 Technical support staff in building (caretaker), other maintenance staff
3 Building user, leader (principle etc.), general user (teacher, employees)
Public administrator networks
6 Technical Consultants
Building contractor

f) What kind of information do they need? (read to the respondent) (prioritise, and specify who)
20 % Energy saving potential
Statistics
Cost, loans and other incitements

40 % Cost – benefit, economy (investments, savings, maintenance)
Short information, overview
Principle sketches
Designing information
Calculation advice
40 % Knowledge about possibilities

g) Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
The energy report for the city on the energy consumption of all municipal buildings

h) Do you have information about the energy saving potentials of innovative technologies?
yes: energy report of the city, the associations mentioned above

i) If yes, is this information available? Where? (Which source)
reports and information available at website

j) Do you know about guidelines on innovative energy saving and renewable energy technologies?
energy decree of the city, additional ones by the association of German cities and towns and the federal states, e.g. Baden-Wuerttemberg

k) If yes: How do you get these guidelines? by demand
X Web-pages, free (examples?)
X Subscriptions, (by post), what kind? technical journals
Subscription, internet based versions
Call on demand – infocentre, etc (where?)
Publisher. Bookstore, institute, institute sales office? few
Others?

l) What are the barriers for not know/get this guidelines:
Don't know where to search (same as answer don't know about any webpage)
Too expensive
don't know about any web-page
don't have subscription /not member,
X too expensive subscription
X others: time-consuming

m) Where would you normally search for guidelines in general?
see 5.k)

n) How can we best give you and others information and help on innovative energy saving and renewable energy technologies?
e-mail newsletter, production of reports in German

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
Main problem (if) is the limited time.

Interviewee D4:

1. The interviewed person and his/her role:

a) Male/female? Male

b) Age? 53

c) What is your position in the organisation, and what is your function? Delegate for the energy design of governmental buildings

2. Retrofit innovation, low energy solutions, general

a) What kind of solutions do you think of as innovative energy saving and renewable energy technologies?

(alternatives, help for the interviewer, mark with "X")

Innovative insulation
High – efficient windows X
Hybrid ventilation X
Improved day lighting
Absorption cooling (solar assistant cooling) X
Reduce of overheating, using building mass and shading (passive)
Heat pumps X
Solar thermal collectors X
Passive Solar gains X
PV-integration X
LCA
Others: specify Micropower generation, storage caverns, double facades

b) Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?

all colleagues in my department

c) Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?

Nachhaltigkeitsleitfaden = guideline for sustainability for governmental buildings

d) If you apply some of these technologies, which ones?

all of the above marked

e) What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?

pro: longterm economical efficiency

contra: economical inefficiency
bad experience from former projects
reliability
permissions (tests) not existing

H2 - Economy

3. a) Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)

no, we focus on life cycle costs

b) Are the investment costs or the total lifecycle cost basis for the decision process?

total life cycle costs only

c) Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
technical decision only

d) Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
as governmental body we can not use any incentives

e) Do you know where to get this kind of information?
yes, from our governmental information system

H3 – Organisation
4.a) Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
yes. ~ 70 employees

b) Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
administrative staff in our organisation

c) When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
when the decision is taken to realise the project and when the vertices of the project aims are defined

d) Who will have the main responsibility for choosing energy friendly solutions?
each project manager, but he has to follow the sustainability guide

e) Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
no

f) The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)
VOB/VOL

H1 -Information
5.a) How do you normally hear about innovative energy saving and renewable energy technologies?
technical journals
DIN
standardisation committee, trade fairs

b) What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc)
all of the above

c) Where do you normally search for information?

Research institutes X
Library (guidelines and books) X
Google X
Special web-sites (specify) X
Magazines, technical or others X
Associations: magazine, web-site, member bookstore X
Teaching materials, textbooks
Conferences X
Courses
Friends and business contacts X
Colleagues X

d) What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?
(general info on technologies, saving potential, economical incitements, guidelines, calculation tools etc.)
General information, saving potential, reliability

e) Other people in the project organisation (see below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)

2 Project leader, your organisation
Technical staff, in your organisation general
1 Building owner
Technical support staff in building (caretaker), other maintenance staff
4 Building user, leader (principle etc.), general user (teacher, employees)
3 Public administrator networks
Technical Consultants
Building contractor

f) What kind of information do they need? (read to the respondent) (prioritise, and specify who)

15 % Energy saving potential
Statistics
Cost, loans and other incitements
40 % Cost – benefit, economy (investments, savings, maintenance)
10 % Short information, overview
10 % Principle sketches
25 % Designing information
Calculation advice
Knowledge about possibilities

g) Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
yearly report on all our buildings

h) Do you have information about the energy saving potentials of innovative technologies?
yes: see above

i) If yes, is this information available? Where? (Which source)
report can be ordered at the Bundesinformationsamt

j) Do you know about guidelines on innovative energy saving and renewable energy technologies?
yes, e.g.: VDI

k) If yes: How do you get these guidelines? from our library
Web-pages, free (examples?)
Subscriptions, (by post), what kind?
Subscription, internet based versions
Call on demand – infocentre, etc (where?)
Publisher. Bookstore, institute, institute sales office?
X Others? Our library

l) What are the barriers for not know/get this guidelines:
Don't know where to search
Too expensive
don't know about any web-page
don't have subscription /not member,
too expensive subscription
others: no barriers

m) Where would you normally search for guidelines in general?
see 5.k) same question

n) How can we best give you and others information and help on innovative energy saving and renewable energy technologies?
e-mail newsletter, production of guidelines published by associations

6. Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
not really hard, but I have limited time.

7.4.5 United Kingdom

The interviewed person and his/her role:
Male/female?

A1	Male
A2	Female
A3	Female
A4	Male
A5	Male

Age

A1	50
A2	33
A3	48
A4	45
A5	39

What is your position in the organisation, and what is your function?

A1	Site Manager
A2	Senior researcher
A3	Administrator
A4	Occupant
A5	Developer

Retrofit innovation, low energy solutions, general

Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?

A1	I am the responsible for any retrofitting project in the building. I do know about energy efficient technologies (insulation, double glazing etc) however not regarding RE technologies. May be solar but not up to what I need to know to make decisions.
A2	This building is devoted to research in Sustainable Development. However, our research group that works on green building has not been called to participate in its design. The university may have a building manager.
A3	The owner of the building is the one responsible for final decisions regarding retrofitting. I only advice on different options, on the economic and financial aspects.
A4	I assume it is the site manager/owner. We, the occupants, try to pressure him to go for RE of EE technologies.
A5	I am head of the engineering division. We make the financial proposal to the company's board that s the body that takes the final decision.

Do you have a policy for applying these kinds of solutions, or do you use more standard guidelines/solutions?

A1	New buildings have guidelines that we need to follow. However, they do not apply for retrofitting.

A2	I do not know…it doesn't look like the persons in charge of decisions care about RE or energy saving solutions.
A3	I am not aware about any specific policy….however all decisions are taken on economic and financial grounds.
A4	There is no policy….we work together with the administration of the building towards a sustainable building.
A5	We are fully committed to implement RE or EE technologies since our aim is to build or retrofit building that fulfils the more restricted CO2 reduction targets. Each building is different, so for each building we analyse in great detailed the options and we set targets. We always chose the least cost technologies that are within the adopted target.

What is the main reason for choosing (or not choosing) an innovative energy saving and renewable energy technologies in your building projects?

A1	I will chose them only if cheaper than standard solutions.
A2	N/A
A3	The reason for choosing EE or RE technologies will always be based on economic and financial performance.
A4	The building is co-administrated by its occupants and we all want EE and RE technologies, but we need to present our case to the owner.
A5	As I said, the build green buildings and we are engaged in green-retrofittings.

H2 - Economy

Energy saving solutions often requires a high investment cost in the first year, with financial savings in the following years. Is this a problem for your budgets? (If yes, do you have any ideas for a solution?)

A1	Yes, it is the main problem. We need government assistant if we would use these technologies.
A2	There are plenty of government subsidies to stimulate the use of RE or energy saving technologies. There is no excuse for not using them.
A3	Yes! Of course it is.
A4	It is a big problem.
A5	It is a problem, of course. We try to minimise it by using all possible incentives that come from the government.

Are the investment costs or the total lifecycle cost a basis for the decision process?

A1	What is the lifecycle cost?
A2	I do not think most decision makers understand the concept of "total lifecycle cost".
A3	We do not base our decisions on lifecycle cost analysis but in the real economy of the technology.
A4	We try to "teach" the owner about lifecycle cost analysis…but it is not easy.
A5	Of course we always do lifetime cost analysis. However, we use this analysis mostly in buildings that will be administrated by us. This analysis only makes sense if we administrate the building and we then participate of the whole lifetime cycle of the building.

Who can decide on using more expensive investments if they have reasonable and justifiable payback time according to energy savings? (Political decision, technical decision, others)

A1	I am the one that makes those decisions, however the payback period is still very long.
A2	At this point, I think this is a political, not technical decision.
A3	If that is the case, I will strongly recommend the solution to the owner.
A4	The final decision is taken by the owner/site manager. We can only present the case to him
A5	As I said, the board of the company is the one that makes the final decision, with our advice.

Do you know about any financial incentives for choosing innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).

A1	I know there are some…however I am not very certain how to get them.
A2	There are two main financial incentives for RE, Blue Skies and the PV Major demonstration programme. On the other side, the Carbon Trust has some incentive lines for energy efficiency technologies.
A3	Yes, we are aware of government incentives.
A4	We know about them…however it is not very clear how we could apply to them.
A5	Of course we do…we need them since our finances only make sense if we make use of them. We use the Carbon Trust small business loan scheme, and the Climate Change Levy and its associated measures.

Do you know where to get this kind of information from?

A1	I do not know
A2	www.thecarbontrust.co.uk and www.est.org.uk
A3	Yes!
A4	We are not technical persons…so it is very difficult to access that information.
A5	Mostly in the carbon trust web site and by been in the right place at the right time.

H3 – Organisation

Do you have special or defined staff that work on building retrofit projects, is so how many employees?

A1	I do have 3 employees
A2	N/A
A3	We are two administrative persons and 4 technical staff (maintenance)
A4	---
A5	Our division has 7 engineers and 3 architects

Who will have the main responsibility for a retrofit project? (Technical staff in your organisation, building "owner" [principal, priest, nursing home manager] or a hired consultant)

A1	I do have the main responsibility
A2	The university
A3	The owner of the building
A4	The site manager/owner
A5	As I said, our division design the project at a technical and financial level.

When, in your opinion, is the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?

A1	These issues should be analysed at the planning stage.
A2	It should be at the design stage
A3	When the retrofitting is being planned
A4	At the planning stage
A5	At the design stage, of course.

Who will have the main responsibility and final decision for choosing energy friendly solutions?

A1	Me
A2	N/A
A3	The owner of the building
A4	The site manager/owner
A5	The board

Do you have networks or knowledge groups with other municipalities/universities/organisations where you can discuss experience gained and knowledge available on innovative energy saving and renewable energy technologies?

A1	No!
A2	There are some networks but at the research level…not for site managers or building owners
A3	No!
A4	No!
A5	We do attend conferences and meeting to keep that updated with the state of the art of the technology.

The type of contract used in the project can impact on the decision process for the use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)

A1	--
A2	--
A3	--
A4	--
A5	--

H1 -Information

How do you normally hear about innovative energy saving and renewable energy technologies?

A1	I do see advertisements in magazines quite often
A2	I usually go to the Carbon Trust and the Energy Saving Trust web site
A3	I read technical magazines but it is quite difficult since I am an administrative.
A4	We look at the EST website
A5	We do use all means available. For us it is very important to know exactly the latest innovations in the EE and ER fields.

What kind of information do you receive? (advertisement, magazines, guidelines, statistics, newsletters etc)

A1	Most of the material I do receive is advertisement, some guidelines…but not very useful
A2	I do receive statistics, guidelines and technical material.
A3	Magazines and newsletters
A4	Advertisement, and magazines
A5	All of the above

Where do you normally search for information?

Research institutes
Library (guidelines and books)
Google and other search engines
Special web-sites (specify)
Magazines, technical publications, other publications
Professional associations/intuitions: magazine, web-site, members' bookstore
Teaching materials, textbooks
Conferences
Courses
Friends and business contacts
Colleagues

A1	Magazines, technical publications
A2	Google and other search engines , Teaching materials, textbooks, Conferences, Courses
A3	Magazines, technical and non-technical publications
A4	Google and other search engines, magazines
A5	All of the above

What kind of information about innovative energy saving and renewable energy technologies would you like available in the decision making phase of the project?
(general info on technologies, saving potential, economical incentives and implications, guidelines, calculation tools etc.)

A1	If I am going to use them, I need to have information about saving potential, economic evaluations, economical incentives and implications, guidelines.
A2	I would like to have calculation tools, simulation tools
A3	I need economic saving potential, economical incentives and financial information
A4	We need non technical information that may help us in convincing the owner…like economic and financial analysis.
A5	All of the above

Other people in the project organisation (list below) may need other types of information about innovative energy saving and renewable energy technologies. Who are, to your opinion, the most important to supply information to? (number in order of priority)

Project leader, your organisation
Technical staff, in your organisation general
Building owner
Technical support staff in building (caretaker), other maintenance staff
Building user, leader (principle etc.), general user (teacher, employees)
Public administrator networks
Technical Consultants

Building contractor

A1	Building owner, caretaker and maintenance staff
A2	Building owner and site manager
A3	Building owner and site manager
A4	Building owner and site manager
A5	In our organisation, we are the division that makes the decisions.

What kind of information do they need? (read to the interviewee, prioritise, and specify who)

General info on technologies - knowledge about possibilities, statistics

Energy saving potential

Economic incentives and implications - capital cost, loans, financing, incentives, benefits, financial savings (investments, savings, maintenance)

Guidelines - overview of technologies, short information, principle sketches, design information

Calculation advice

A1	Energy saving potential, Economic incentives and implications - capital cost, loans, financing, incentives, benefits, financial savings (investments, savings, maintenance)
A2	Economic incentives and implications - capital cost, loans, financing, incentives, benefits, financial savings
A3	Technical information
A4	Technical information, economic incentives and implications - capital cost, loans, financing, incentives, benefits, financial savings
A5	Already answered

Do you use any kind of energy statistics, energy reports or news magazine about innovative energy saving and renewable energy solutions?

A1	No!
A2	I use energy magazines and technical reports
A3	I use magazines and newsletters with financial and economic information
A4	We do use energy statistics but we are not technical persons
A5	We use BRE and CIBSE library and newsletters for technical information and guidelines; we use Carbon Trust for information coming from the government; architectural magazines and journals.

Do you have information about the energy saving potentials of innovative technologies? If yes, from what source?

A1	No!
A2	I use the CT or the EST web site
A3	I use EST web site
A4	We use literature from installers
A5	CIBSE, BRE, the CT

Do you know about guidelines on innovative energy saving and renewable energy technologies?

A1	No!
A2	I use the EST guidelines
A3	I use guidelines downloaded from the EST site
A4	Yes!
A5	Of course, we depend on them!!!

If yes: How do you get these guidelines?

Web-pages, free (examples)
Subscriptions by post
Subscription, internet based (what kind, where from)
Call and demand – infocentre, etc (what kind, where from)
Publishers, bookstores, institutes
Others

A1	--
A2	Web-pages
A3	Web-pages
A4	We get information at fairs and information centres
A5	CIBSE-BRE-the CT

What are the barriers for not knowing about or obtaining these guidelines:

Don't know where to search
Too expensive
Don't know about any web-page
Don't have subscription /not member,
Too expensive to subscribe
Others

A1	Don't know where to search
A2	I think the problem is that people do not know where to look for…
A3	I do not think there is any barrier
A4	Don't know where to search
A5	They are expensive, there are some that are free but you need to know how to get them.

Where would you normally search for guidelines in general?

A1	In the web…but what I get is very confuse
A2	I interchange them with colleagues, in conferences.
A3	Web site
A4	I already said…at fairs or information centres
A5	Already answered

How can we best give you and others information and help on innovative energy saving and renewable energy technologies?

A1	I think you need to propose something and reach people like me.
A2	An European website
A3	Non technical information is needed
A4	We need basic information for non technical persons that could be use to influence technical persons
A5	By bringing examples that put us in touch with the European dimension, learning from what is happening elsewhere in Europe.

Do you think it is hard to be updated on energy efficient solutions and if so, what is the main reason why you do not have up-to-date knowledge/information?

A1	Don't naturally come across this information, Don't typically look for information, only pick up "what falls in front of your nose"
A2	I am up to date with the information
A3	I do not think it is difficult
A4	Hard to search for and find information
A5	It costs us a lot of money (overheads) but we depend on that.

7.4.6 Italy

Interviewee I1:
The interviewed person and his/her role:
Male/female? Male
Age? 59
What is your position in the organisation, and what is your function? Mayor (of a small town)

Retrofit innovation, low energy solutions, general
What kind of solutions do you think of as innovative energy saving and renewable energy technologies?

Innovative insulation
Presence detector
Temperature sensor
Cogeneration
Solar cells
Solar thermal collectors

Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?
Chief of the Public Works sector

Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?
We use standard solutions

If you apply some of these technologies, which ones?
We do not

What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?
Our building property is characterized by old construction style and technics

H2 - Economy
Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
Yes. We could take out mortgages or, better, use specific public financial supports

Are the investment costs or the total lifecycle cost basis for the decision process?
The total lifecycle cost

Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
Political decision

Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
Yes

Do you know where to get this kind of information?
Web sites and specific magazines

H3 – Organisation
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
No

Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
A hired consultant

When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
Preliminary phase

Who will have the main responsibility for choosing energy friendly solutions?
Project leader

Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
No

The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)
We use public auction and private treaty, without points about innovative energy saving

H1 -Information
How do you normally hear about innovative energy saving and renewable energy technologies?

What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc)
Magazines

Where do you normally search for information?
- Google
- Special web-sites
- Magazines, technical or others
- Conferences

What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?
Economical incitements

Other people in the project organisation (se below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)

1. Project leader, in the organisation
2. Technical support staff in building (caretaker), other maintenance staff
3. Building user, leader (principle etc.), general user (teacher, employees)

What kind of information do they need? (read to the respondent) (prioritise, and specify who)

1 Energy saving potential
    1, 3 Statistics
1 Cost, loans and other incitements
    1, 2, 3 Cost – benefit, economy (investments, savings, maintenance)
    1, 2, 3 Short information, overview
1 Principle sketches
1 Designing information
1 Calculation advice
1 Knowledge about possibilities

Do you have information about the energy saving potentials of innovative technologies?
If yes, is this information available? Where? (Which source)
No

Do you know about guidelines on innovative energy saving and renewable energy technologies?
Yes

If yes: How do you get these guidelines?
Web-pages, free

What are the barriers for not know/get this guidelines:
Don't know where to search

Where would you normally search for guidelines in general?
Internet

How can we best give you and others information and help on innovative energy saving and renewable energy technologies?
Through Internet and congress

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
No

Interviewee I2:
The interviewed person and his/her role:
1. Male/female? F
2. Age? 48

3. What is your position in the organisation, and what is your function?
Executive "Property and Logistics" Council Regione Lombardia

Retrofit innovation, low energy solutions, general
1. What kind of solutions do you think of as innovative energy saving and renewable energy technologies?
Concerning office buildings (our property target) :
- lighting control, with daylight sensor or presence detector
- cooling control: cooling systems efficiency and window shelters

2. Who in your organisation SHOULD HAVE an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?
Our internal technical office and our external consultants "Punti Energia" (that provides us with energy manager)

3. Do you have a policy for applying these kinds of solutions, or do you use more standard solutions? If you apply some of these technologies, which ones?
We try to do that but generally not really with emphasis
We have applied:
presence detectors for lighting
water to water heat pump for heating
solar thermal collectors
pv cells
fuel cells

4. What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?
We choose them for energy saving and environment protection.

H2 - Economy
1. Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
Yes. To make aware about environment aspects and assessment

2. Are the investment costs or the total lifecycle cost basis for the decision process?
Unfortunately the investment costs
Moreover, total lifecycle costs (and so the potential savings) have to be worked out and submitted to political decision makers by the designer (that are external)
But designer are not often sensitive to this themes, moreover they try to keep low the design costs so they can't do an accurate accounting

3. Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
In case of representative buildings, political decision makers, for normal works, technicians

4. Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
Yes, many of them are supplied by our organization
Not very much from European Community, I think

5. Do you know where to get this kind of information?
From our external consultants “Punti energia”

H3 – Organisation
1. Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
Internal technical office and external designer

2. Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building “owner” (principal, priest, nursing home manager) or a hired consultant?
External designers, internal staff only as supervision and for approvals

3. When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
Preliminary project, then it’s impossible to do effectiveness actions

4. Who will have the main responsibility for choosing energy friendly solutions?
External designers, we give only some indications

5. Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
Our “Environment Department”, but not concerning with our property.

6. The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)
Generally we don’t enclose energy saving requirements in the contracts, we do it only for the most representative of our buildings

H1 -Information
1. How do you normally hear about innovative energy saving and renewable energy technologies?
Internal colleagues
magazines and news

2. What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc)
skipped

3. Where do you normally search for information?
1 Associations
2 work contacts
3 our consultants

4. What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?
(general info on technologies, saving potential, economical incitements, guidelines, calculation tools etc.)

saving potential
economical incitements
guidelines

5. Other people in the project organisation (se below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)

- 1 – Project leader
- 1 – Technical staff
- 2- Technical support staff and maintenance staff
- 2 – External consultants

6. What kind of information do they need? (read to the respondent) (prioritise, and specify who)

- cost-benefit, economy - Project leader
- principle sketches and designing informations - Technical staff

7. Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
see next answer

8. Do you have information about the energy saving potentials of innovative technologies? If yes, is this information available? Where? (Which source)
No.

9. Do you know about guidelines on innovative energy saving and renewable energy technologies?
No.

10. What are the barriers for not know/get this guidelines:
Lack of time, this activity is delegated to our consultants “Punti Energia”

11. Where would you normally search for guidelines in general? (changed: where would you like to find guidelines?)
Internet

12. How can we best give you and others information and help on innovative energy saving and renewable energy technologies?
Making aware our technicians; but it’s difficult because persons in charge change too frequently so they prefer to achieve immediate results insted of long-term better results.

13. Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don’t have updated knowledge/information?
Yes, there are too many vague and imprecise informations and few concrete and easily applicable one.

Interviewee I3:
The interviewed person and his/her role:
1 Male/female? M
2 Age? 43

3 What is your position in the organisation, and what is your function?
Executive cadres in D.G. Landscape and Urban Planning - Regione Lombardia.
Geology technician for the "Water-Geological and Seismic Risks" area

Retrofit innovation, low energy solutions, general
1. What kind of solutions do you think of as innovative energy saving and renewable energy technologies?

High – efficient windows
Solar thermal collectors
High – efficient lamps

2. Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?

3. Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?
If you apply some of these technologies, which ones?

4. What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?

H2 - Economy
1. Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
I don't think "Energy saving solutions" are included in the priority actions of Regione Lombardia

2. Are the investment costs or the total lifecycle cost basis for the decision process?

3. Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
Political decision

4. Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
Yes

5. Do you know where to get this kind of information?
Yes, for some of them

H3 – Organisation
1. Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
Yes

2. Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
Building "owner"

3. When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
Preliminary project

H1 -Information
1. How do you normally hear about innovative energy saving and renewable energy technologies?
Internet
Guidelines and books

3. Where do you normally search for information?
1 Special web-sites
2 Conferences
3 Friends and business contacts

4. What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?
(general info on technologies, saving potential, economical incitements, guidelines, calculation tools etc.)
Economical incitements, Guidelines

5. Other people in the project organisation (se below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)

Project leader, your organisation 2
Technical staff, in your organisation general 3
Building owner 1
Technical support staff in building (caretaker), other maintenance staff
Building user, leader (principle etc.), general user (teacher, employees)
Public administrator networks
Technical Consultants
Building contractor 4

6. What kind of information do they need? (read to the respondent) (prioritise, and specify who)

Energy saving potential
Statistics
Cost, loans and other incitements
Cost – benefit, economy (investments, savings, maintenance) 1, 2, 3, 4
Short information, overview
Principle sketches
Designing information
Calculation advice
Knowledge about possibilities 1

7. Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
No

9. Do you know about guidelines on innovative energy saving and renewable energy technologies?
From Internet (for example about Solar thermal collectors)

11. Where would you normally search for guidelines in general?
Internet

13. Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
little time to keep up to date

Interviewee I4:
The interviewed person and his/her role:
1. Male/female? M
2. Age? 63

3. What is your position in the organisation, and what is your function?
Executive – Energy manager – CONI (Comitato Olimpico Nazionale Italiano)

Retrofit innovation, low energy solutions, general
1. What kind of solutions do you think of as innovative energy saving and renewable energy technologies?
First of all it will be very useful to reorganize and make more efficient our technologies yet in use (many systems are under-used, others are not effective in order to insufficient maintenance)
Then, for our kind of property, to adopt remote control
Then, for swimming pools, thermal recovery from water change

2. Who in your organisation SHOULD HAVE an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?
External technical staff and our internal supervisors (few technicians)

3. Do you have a policy for applying these kinds of solutions, or do you use more standard solutions? If you apply some of these technologies, which ones?
Generally we use more standard solutions even if I try to press to more energy efficiency
We adopted:
cogenerations for swimming-pools
remote control
purchase of green energy
15 years ago we installed solar thermal collectors but, due to lack of maintenance, now they are not yet in use

4. What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?
Poor environmental sensitivity, making a choice appearance is preferred to substance

H2 - Economy

1. Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
Yes, long-term savings are calculated but then not really taken into account
Administrators change too frequently and they want to obtain immediate results.
I think it will be important to increase administrators and internal technicians environmental sensitivity

2. Are the investment costs or the total lifecycle cost basis for the decision process?
In the end, investment costs

3. Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
It depends on project importance, generally administrative executive but they have not the proper technical qualifications

4. Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
Yes
We used incentives for cogeneration

5. Do you know where to get this kind of information?
Generally from bulletin, but also from many different fonts

H3 – Organisation

1. Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
Small technical office (only as supervisors) and external designers

2. Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
External designers, but also administrators whom, if they don't know what to ask for, often order not pertinent work

3. When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
Preliminary project

4. Who will have the main responsibility for choosing energy friendly solutions?
External designers and administrators – it will be useful to give more responsibility to the internal technicians or reliable consultants

5. Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
We have a general CONI web site; now we are trying to develop one specifically about sports complex technical management and maintenance supported by one of our external energy manager

6. The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)
In order to improve energy saving we try to count on the "Planned Maintenance" section of the whole contract.
But, unfortunately, due to lack of money and understanding of savings that can derive from an efficient maintenance, now this section is generally leaved out.
Moreover, often the technical systems section is only a little part of the whole contract, so it is generally take by subcontractor

H1 -Information
3. Where do you normally search for information?
Internet
sector conferences
contacts with university
external consultants

4. What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?
(general info on technologies, saving potential, economical incitements, guidelines, calculation tools etc.)
Saving potential

5. Other people in the project organisation (se below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)
I think it will be useful to inform all the people from administrators to technicians as far as the end users (as exemple, we find situation in which, with air conditioning on, all the windows are open)

7. Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
see next answer

8. Do you have information about the energy saving potentials of innovative technologies? If yes, is this information available? Where? (Which source)
see answer 3

9. Do you know about guidelines on innovative energy saving and renewable energy technologies?
Yes

11. Where would you normally search for guidelines in general? (changed: where would you like to find guidelines?)
see answer 3

13. Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
No

Interviewee I5:
The interviewed person and his/her role:
1. Male/female? M
2. Age? 40
3. What is your position in the organisation, and what is your function? Executive Energy Manager - Municipality of Palermo

Retrofit innovation, low energy solutions, general
1. What kind of solutions do you think of as innovative energy saving and renewable energy technologies?

Thermal insulation
Solar thermal and PV collectors
High – efficient boilers
Geothermal Heat pumps
Advanced management and monitoring

2. Who in your organisation SHOULD HAVE an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?
Heads of Dept. of:
Public Works
Services of management and refurbishment
School buildings sector

3. Do you have a policy for applying these kinds of solutions, or do you use more standard solutions? If you apply some of these technologies, which ones?
PV panels, ventilated roofs and solar chimneys, special windows, Geothermal Heat pumps

4. What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?
Economical-financial, lack of adequate management and coordination.

H2 - Economy
1. Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
Not for us.
Anyway, my suggestion is to invest the money saved after each energy saving measures directly for other similar campaigns (not for other kind of activities)

2. Are the investment costs or the total lifecycle cost basis for the decision process?
The investment cost

3. Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
Political decision, after, of course, the technical-economical evaluation…

4. Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
Yes

5. Do you know where to get this kind of information?
Internet and by talking with colleagues of other Public Administration offices

H3 – Organisation
1. Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
Yes, 3 peoples and other external peoples depending on each project

2. Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
Me

3. When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
Preliminary project

4. Who will have the main responsibility for choosing energy friendly solutions?
Me

5. Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
Euro cities, Energie-Cité, Kyoto Club, Agenda 21, etc.

6. The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)

- Services contracts for improving energy supplies (directly subscribed by the Municipality)
- Public contracts (by tenders)

H1 -Information
1. How do you normally hear about innovative energy saving and renewable energy technologies?
Congresses
Magazines
Companies and enterprises (for building technologies and components)

2. What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc) skipped

3. Where do you normally search for information?
1 Internet
2 Universities
3 Enterprises

4. What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?
(general info on technologies, saving potential, economical incitements, guidelines, calculation tools etc.)
Firstly the information about the economical incitements (for reaching the political agreement)

5. Other people in the project organisation (se below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)

Project leader, your organisation
Technical staff, in your organisation general
Building owner
Technical support staff in building (caretaker), other maintenance staff 1 !!!
Building user, leader (principle etc.), general user (teacher, employees)
Public administrator networks
Technical Consultants
Building contractor

7. Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
see next answer

8. Do you have information about the energy saving potentials of innovative technologies? If yes, is this information available? Where? (Which source)
Yes, I have collected it during several years and it is available in my office (different support)

9. Do you know about guidelines on innovative energy saving and renewable energy technologies?
ENEA
European Projects
(and we are also developing something in this frame…)

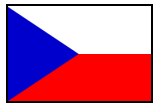
11. Where would you normally search for guidelines in general? (changed: where would you like to find guidelines?)
Manuals
Internet

12. How can we best give you and others information and help on innovative energy saving and renewable energy technologies?
Data base of industries and companies, ordered by technologies, that have realised retrofit actions (with results, problems, solutions, etc.)

13. Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
Time!

7.4.7 Greece

7.4.8 Czech Republic



	Interviewed persons			
Male/female	# 1 Male	#2 Male	#3 Male	#4 Female
Age	59	50	49	51
Position	Head of department City council	Mayor of a small city (large village)	Head of investment department	Head of city residential buildings department.
Retrofit innovation, low energy solutions, general				
What kind of solutions do you think of as innovative energy saving and renewable energy technologies	Innovative insulation, High – efficient windows, Hybrid ventilation, Improved day lighting, Absorption cooling, Reduce of overheating, using building mass and shading, Heat pumps, Solar thermal collectors, Passive Solar gains, PV-integration	High – efficient windows Heat pumps, Innovative insulation,	Innovative insulation Heat pumps, High – efficient windows,	Innovative insulation, High – efficient windows, Heat pumps, Solar thermal collectors
Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects	Heads of all relevant departments have available energy audits of all public buildings and also programs focusing on energy savings and alternative energy resources that are part of "Municipal energy concept".	Member of local council	Power engineer	Energy department
Do you have a policy for applying these kinds of solutions, or do you use more standard solutions	Ongoing designs of energy saving measures recommended in energy audits	No	More standard solutions	energy audits are basis

If you apply some of these technologies, which ones	Heating control, retrofit of heating system, insulation, energy management	We don't apply	High – efficient windows Heat pumps	Heating control, retrofit of heating system, insulation
What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects	Economical payback time	We don't realise the buildings projects	Comfort for occupants	Economical payback time
H1 -Information				
How do you normally hear about innovative energy saving and renewable energy technologies	Magazines, seminars, conferences, internet	Info from specialists	Web sites, courses, newsletters	Magazines, seminars, internet
What kind of information do you get	Magazines, information leaflets, specialised literature	Advertisement, magazines, newsletters	Advertisement, magazines, newsletters	Advertisement, newsletters
Where do you normally search for information	Research institutes, Library, Google, Special web-sites (TZB-info), Magazines, technical and other Magazines, technical and other associations, Teaching materials, textbooks, Conferences, Courses, Friends and business contacts, Colleagues	Colleagues Friends and business contacts Special web-sites (various)	Special web-sites (various) Magazines, technical Associations, member bookstore, Friends and business contacts,	Research institutes, Special web-sites (TZB-info), Friends and business contacts
What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project	Feasibility study focusing on economical efficiency and environmental issues	general info on technologies, saving potential, economical incitements	general info on technologies, saving potential, economical incitements	Feasibility study focusing on economical efficiency

Other people in the project organisation (see below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information	Technical Consultants Project leader, my organisation Technical staff, in my organisation general Building user, leader (principle etc.), general user (teacher, employees) Technical support staff in building (caretaker), other maintenance staff Public caretaker networks Building contractor	Project leader Technical consultants	Project leader, Building owner Building user,	Project leader, Building owner, Public caretaker networks
What kind of information do they need	Energy saving potential Public caretaker networks Statistics Cost, loans and other incitements Design information Calculation advice Short information, Knowledge about possibilities. Principle sketches	Cost – benefit, economy Cost, loans and other incitements Knowledge about possibilities Energy saving potential Design information Short information,	Cost, loans and other incitements Cost – benefit, economy Short information, overview Designing information	Cost – benefit, economy Energy saving potential Cost, loans and other incitements Design information Short information
Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions	Magazines	No	No	Magazines
Do you have information about the energy saving potentials of innovative technologies	City energy concept	No	Yes, energy audit	Yes, energy audit
If yes, is this information available? Where	Yes. City dossier		City dossier	City dossier
Do you know about guidelines on innovative energy saving and renewable energy technologies	Web sites	No	yes-in part	yes-in part

If yes: How do you get these guidelines	Download Web sites	Request from regional authorities	Web-pages, free	Web-pages, free
What are the barriers for not know/get this guidelines	No	Little time	Can't specify	Time
Where would you normally search for guidelines in general	Web sites	Request from regional authorities	Friends and business contacts, Special web-sites	Friends and business contacts, Special web-sites
How can we best give you and others information and help on innovative energy saving and renewable energy technologies	Complete information on already finished projects	Maybe info from already successful projects	Appointment, magazines, newsletters	Appointment, magazines, newsletters
Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information	Not for me Generally: little time to keep up to date don't naturally get across this information, don't seek for information, only pick up "what falls on your nose"	In generally I don't think it's hard to get info	No	No, but little time to keep up to date
H2 - Economy				
Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)	Budget is a problem. More elaborated system of bank loans, support from region, state and EC.	We prefer energy cheap solutions	Yes - occasionally, Government subsidy	Budget is a problem. Larger support from Region and government
Are the investment costs or the total lifecycle cost basis for the decision process	Investment costs	Investment costs	Investment costs	Investment costs

Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings	Political	Technical decision	Political decision	Political
Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies	Regional council, Czech energy agency, agency SEVEn, internet	No	Subsidy	Regional council, Czech energy agency,
Do you know where to get this kind of information	Same as previous	regional authority, ministry for regional development, Special web-sites	Yes	Regional authority, ministry for regional development
H3 – Organisation				
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)	Yes. City energy management, varying – approx. 10	No	No	Yes. City energy department. Varying number, about 4
Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant	Heads of city council departments, directors of institutions and schools	Investor and consultant	Technical staff	Heads of city council departments, Technical staff
When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies	Initial phase in formulation of the project	Initial phase in formulation of the project	Study, investment plan	Investment plan
Who will have the main responsibility for choosing energy friendly solutions	Investor. Energy auditor.	Designer	Technical staff for less than 2 mil. CZK, city council for more than 2 mil. CZK.	Investor. Energy auditor

Do you have networks etc. with other municipalities /universities /organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies	Yes. EKIS CEA, SEVEn, Energy board of the Czech union of cities and villages and others	I don't know about	No	Yes. EKIS CEA,
The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)	1. Generally from budget of city 2. Budget and grants 3. Associations – private project		1. Generally from budget of city 2. Budget and grants 3. Associations – private project	From city budget

Interviewed persons		
Male/female	#5 Male	#6 Male
Age	55	41
Position	Head of University investment department	Director (kvestor) of University
Retrofit innovation, low energy solutions, general		
What kind of solutions do you think of as innovative energy saving and renewable energy technologies	Innovative insulation, High – efficient windows, Heat pumps, Solar thermal collectors	High – efficient windows Heat pumps, Solar thermal collectors,
Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects	Heads of energy departments of individual faculties	Employee of investment department, heads of energy units
Do you have a policy for applying these kinds of solutions, or do you use more standard solutions	Ongoing designs of energy saving measures recommended in energy audits	Energy savings measures suggested in energy audits
If you apply some of these technologies, which ones	Heating control, retrofit of heating system, insulation, energy management	Depends on financial resources, priorities are in insulation and windows
What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects	Investment costs Economical payback time	Investment costs
H1 -Information		
How do you normally hear about innovative energy saving and renewable energy technologies	Magazines, seminars, internet	Magazines, internet, experts advise
What kind of information do you get	Magazines, information leaflets, specialised literature	Advertisement, magazines, energy audits

Where do you normally search for information	University departments, Research institutes, Library, Google, Special web-sites (TZB-info), Friends and business contacts, Colleagues	Special web-sites (various), Colleagues, experts from university
What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project	Feasibility study focusing on economical efficiency and environmental issues	general info on technologies, saving potential, economical incitements
Other people in the project organisation (see below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information	Technical Consultants Project leader, Technical staff in my organisation general Building user, Technical support staff in building (caretaker), other maintenance staff	Contractor's designers Technical consultants
What kind of information do they need	Energy saving potential Cost, loans and other incitements Design information Calculation advice Short information overview, Knowledge about possibilities. Principle sketches	Energy saving potential Cost – benefit, economy Cost, loans and other incitements Design information Short information, overview
Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions	Magazines	Energy audits, energy consumption records
Do you have information about the energy saving potentials of innovative technologies	Yes	Partly

If yes, is this information available? Where	Energy audits	Yes, energy audits
Do you know about guidelines on innovative energy saving and renewable energy technologies	Yes	Partly
If yes: How do you get these guidelines	CEA, Ministry of industry and trade, Ministry for regional development	Request from governmental agencies
What are the barriers for not know/get this guidelines	No	No
Where would you normally search for guidelines in general	Directives, Web sites	governmental agencies
How can we best give you and others information and help on innovative energy saving and renewable energy technologies	Complete information on already finished projects	information on already finished projects, specialised newsletters
Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information	Not for me	No
H2 - Economy		
Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)	Budget is a problem. More elaborated system of bank loans, support from region, state and EC.	Budget is a problem
Are the investment costs or the total lifecycle cost basis for the decision process	Investment costs	Investment costs

Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings	Political decision (University board)	Political decision (University board)
Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies	National program of energy savings and use of renewable energy sources	National program of energy savings and use of renewable energy sources
Do you know where to get this kind of information	Same as previous	ministry for regional development, Regional authority,
H3 – Organisation		
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)	Yes. University investment department – approx. 2	Yes. University investment department – approx. 3
Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant	Heads of investment department, director (kvestor) of the University,	Investor
When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies	Initial phase in formulation of the project	Initial phase in formulation of the project
Who will have the main responsibility for choosing energy friendly solutions	Investor. Energy auditor.	Investor, Designer

Do you have networks etc. with other municipalities /universities /organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies	No.	No
The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)	Generally from University and Ministry of education budget.	Generally from University and Ministry of education budget.

7.4.9 Lithuania

Interviewee LT1:
The interviewed person and his/her role:
Male/female? Male.
Age? 30
What is your position in the organisation, and what is your function? Project manager for designing.

Retrofit innovation, low energy solutions, general
What kind of solutions do you think of as innovative energy saving and renewable energy technologies?

(alternatives, help for the interviewer, mark with "x")
Innovative insulation
High – efficient windows
Hybrid ventilation
Improved day lighting
Absorption cooling (solar assistant cooling) x
Reduce of overheating, using building mass and shading (passive) x
Heat pumps
Solar thermal collectors x
Passive Solar gains x
PV-integration
LCA x
Others: specify

Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?
Quality department and technical manager.

Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?
Mostly standard.

If you apply some of these technologies, which ones?
Absorption cooling.

What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?
Extra cost.

H2 – Economy
Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
Yes. Main idea is to get government position and additional loan rebate for these kind of projects.

Are the investment costs or the total lifecycle cost basis for the decision process?
Yes they are.

Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
It's a political decision of investor.

Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
Loan

Do you know where to get this kind of information?
Yes

H3 – Organisation
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
Yes we have. A main target is document preparing to take part in tenders. Mostly it's big projects. 4 employees.

Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
The building owner.

When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
In earlier stage of project, main idea and finance planning.

Who will have the main responsibility for choosing energy friendly solutions?
Technical manager and customer.

Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
Yes, there are some specialists in local university.

H1 -Information
How do you normally hear about innovative energy saving and renewable energy technologies?
During project development.

What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc.)
Most often magazines.

Where do you normally search for information?
- Research institutes x
- Library (guidelines and books) x
- Google x
- Special web-sites (specify)
- Magazines, technical or others
  - Associations: magazine, web-site, member bookstore
  - Teaching materials, textbooks
  - Conferenses x
  - Courses
  - Friends and business contacts x
  - Colleagues

Other people in the project organisation (se below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)
- Project leader, your organisation 2
- Technical staff, in your organisation general 1
- Building owner 3
- Technical support staff in building (caretaker), other maintenance staff 6
- Building user, leader (principle etc.), general user (teacher, employees) 5
- Public administrator networks 8
- Technical Consultants 4
- Building contractor 7

What kind of information do they need? (read to the respondent) (prioritise, and specify who)
- Energy saving potential Technical support staff in building (caretaker), other maintenance staff
- Statistics
- Cost, loans and other incitements ->Building owner
  - Cost – benefit, economy (investments, savings, maintenance) -> Building owner, maintenance staff
  - Short information, overview -> Building contractor
- Principle sketches -> Technical Consultants
- Designing information -> Technical staff, in your organisation general
- Calculation advice -> Technical staff
- Knowledge about possibilities -> Project leader

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
No.

Do you have information about the energy saving potentials of innovative technologies? Just short information and overview.
If yes, is this information available? Where? (Which source)

Do you know about guidelines on innovative energy saving and renewable energy technologies? Yes.

If yes: How do you get these guidelines?
Web-pages, free (examples?) http://www.est.org.uk and other common sites.

Where would you normally search for guidelines in general?
Internet.

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
hard to know when new info is available

Interviewee LT2:
The interviewed person and his/her role:
Male/female? Male.
Age? 43.
What is your position in the organisation, and what is your function? Project manager for construction.

Retrofit innovation, low energy solutions, general
What kind of solutions do you think of as innovative energy saving and renewable energy technologies?

(alternatives, help for the interviewer, mark with "x")
Innovative insulation x
High – efficient windows x
Hybrid ventilation
Improved day lighting
Absorption cooling (solar assistant cooling)
Reduce of overheating, using building mass and shading (passive)
Heat pumps
Solar thermal collectors
Passive Solar gains
PV-integration
LCA
Others: specify

Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?
Technologists.

Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?
Yes.

If you apply some of these technologies, which ones?
Innovative insulation and high efficient windows.

What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?
The main reason for choosing an innovative energy saving technologies in our building projects is that building properties will achieve European standards.

H2 - Economy
Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
It is the problem for our budget. It can be subsidies or loans.

Are the investment costs or the total lifecycle cost basis for the decision process?
Yes.

Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
Chiefs of enterprises taking into account advises of technologists.

Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
Special lons.

Do you know where to get this kind of information?
Yes.

H3 – Organisation
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
No.

Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
Building owner.

When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
Brief and design phases.

Who will have the main responsibility for choosing energy friendly solutions?
Project development co-ordinator, guide of contractor

Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
No.

H1 -Information
How do you normally hear about innovative energy saving and renewable energy technologies?
Internet, annual exhibitions, special courses.

What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc)
Magazines, exhibitions, advertisements.

Where do you normally search for information?

- Research institutes
- Library (guidelines and books)
- Google X
- Special web-sites (specify)
- Magazines, technical or others X
- Associations: magazine, web-site, member bookstore X
- Teaching materials, textbooks
- Conferenses
- Courses X
- Friends and business contacts X
- Colleagues

Other people in the project organisation (se below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)

- Project leader, your organisation X
- Technical staff, in your organisation general
- Building owner
- Technical support staff in building (caretaker), other maintenance staff
- Building user, leader (principle etc.), general user (teacher, employees)
- Public administrator networks
- Technical Consultants X
- Building contractor

What kind of information do they need? (read to the respondent) (prioritise, and specify who)

- Energy saving potential X
- Statistics
- Cost, loans and other incitements
- Cost – benefit, economy (investments, savings, maintenance) X
- Short information, overview
- Principle sketches
- Designing information
- Calculation advice
- Knowledge about possibilities

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
Yes.

Do you have information about the energy saving potentials of innovative technologies? If yes, is this information available? Where? (Which source)
Journals, advertisements, special courses, special TV programmes.

Do you know about guidelines on innovative energy saving and renewable energy technologies?
Yes.

If yes: How do you get these guidelines?
Web-pages, free (examples?) x
Subscriptions, (by post), what kind?
Subscription, internet based versions
Call on demand – infocentre, etc (where?)
Publisher. Bookstore, institute, institute sales office? X
Others?

What are the barriers for not know/get this guidelines:
Don't know where to search X
Too expensive
don't know about any web-page
don't have subscription /not member,
too expensive subscription
others

Where would you normally search for guidelines in general?
Exhibitions.

How can we best give you and others information and help on innovative energy saving and renewable energy technologies?
Consultations.

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
little time to keep up to date X
don't naturally get across this information,
Hard to search for information, X
hard to know when new info is available
don't know about the distributor of information.
don't read the right magazine,
don't seek for information, only pick up "what falls on your noze"

Interviewee LT3:
The interviewed person and his/her role:
Male/female? male
Age? 29
What is your position in the organisation, and what is your function? General director of construction, organization of constructions.

Retrofit innovation, low energy solutions, general
What kind of solutions do you think of as innovative energy saving and renewable energy technologies?
(alternatives, help for the interviewer, mark with "x")
Innovative insulation x
High – efficient windows x

Hybrid ventilation x
Improved day lighting x
Absorption cooling (solar assistant cooling)
Reduce of overheating, using building mass and shading (passive)
Heat pumps
Solar thermal collectors
Passive Solar gains
PV-integration
LCA
Others: specify

Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?
Nobody

Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?
We use standard solutions as usual

If you apply some of these technologies, which ones?
Insulation, usage of efficient windows

What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?
Project's costs

H2 – Economy
Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
It is not a problem; all belongs from project cost and possibilities

Are the investment costs or the total lifecycle cost basis for the decision process?
Yes, certainly

Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
Generally it must be political decision, but it must maybe some financial programme from political mans. From other side it is every building customer decision.

Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies?
loan, subsidy, potential reduced energy bills

Do you know where to get this kind of information?
Yes

H3 – Organisation
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
No

Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
In main case building owner

When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
Organization of project

Who will have the main responsibility for choosing energy friendly solutions?
Building owner

Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
No

H1 -Information
How do you normally hear about innovative energy saving and renewable energy technologies?
Every day

What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc)
All this information

Where do you normally search for information?

- Research institutes x
- Library (guidelines and books)
- Google
- Special web-sites (specify)
- Magazines, technical or others
  - Associations: magazine, web-site, member bookstore
  - Teaching materials, textbooks x
  - Conferenses
  - Courses
  - Friends and business contacts x
  - Colleagues x

What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?
General info on technologies, saving potential, economical incitements

Other people in the project organisation (se below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)

- Project leader, your organisation - 1
- Technical staff, in your organisation general - 2
- Building owner - 3
- Technical support staff in building (caretaker), other maintenance staff - 6

Building user, leader (principle etc.), general user (teacher, employees) - 7
Public administrator networks - 8
Technical Consultants - 4
Building contractor - 5

What kind of information do they need? (read to the respondent) (prioritise, and specify who)
Energy saving potential -> Technical staff
Statistics -> Technical staff
Cost, loans and other incitements -> Project leader, Building owner
Cost – benefit, economy (investments, savings, maintenance) -> Building owner
Short information, overview -> Building owner
Principle sketches
Designing information -> Technical staff
Calculation advice -> Technical staff
Knowledge about possibilities
At least all must have some knowledge about this

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
No

Do you have information about the energy saving potentials of innovative technologies?
Some

If yes, is this information available? Where? (Which source)
Main-knowledge from student time, some magazines, technical literature

Do you know about guidelines on innovative energy saving and renewable energy technologies?
Yes

If yes: How do you get these guidelines?
Web-pages, free (examples?) X Find from internet search systems
Subscriptions, (by post), what kind?
Subscription, internet based versions X
Call on demand – infocentre, etc (where?)
Publisher. Bookstore, institute, institute sales office?
Others?

What are the barriers for not know/get this guidelines:
Don’t see barriers

Where would you normally search for guidelines in general?
In internet

How can we best give you and others information and help on innovative energy saving and renewable energy technologies?
It must be global target with financial help from political mans

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
It's not so hard

Interviewee LT4:
The interviewed person and his/her role:
Male/female? Male
Age? 44
What is your position in the organisation, and what is your function? Construction projects manager

Retrofit innovation, low energy solutions, general
What kind of solutions do you think of as innovative energy saving and renewable energy technologies?

(alternatives, help for the interviewer, mark with "x")
Innovative insulation
High – efficient windows
Hybrid ventilation x
Improved day lighting
Absorption cooling (solar assistant cooling)
Reduce of overheating, using building mass and shading (passive)
Heat pumps
Solar thermal collectors x
Passive Solar gains x
PV-integration x
LCA
Others: specify

Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?
Tech staff

Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?
no

What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?
Cost calculations

H2 – Economy
Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
No

Are the investment costs or the total lifecycle cost basis for the decision process?
Yes.

Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
Technical decision

Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
YES

Do you know where to get this kind of information?
YES

H3 – Organisation
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
Techn. staff

Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
Techn. staff

When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies?
In the beginning of the project

Who will have the main responsibility for choosing energy friendly solutions?
Techn. staff

Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
Yes

The type of contract used in the project influent the organisation and can influent the decision process on use of innovative energy saving and renewable energy technologies. What kind of contracts do you normally use? (leave out if you only have one alternative for your country)
Contract Agrement

H1 -Information
How do you normally hear about innovative energy saving and renewable energy technologies?
Conferences, newspapers

What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc)
all kinds

Where do you normally search for information?

- Research institutes
- Library (guidelines and books) x
- Google x

Special web-sites (specify) x
Magazines, technical or others x
Associations: magazine, web-site, member bookstore
Teaching materials, textbooks
Conferenses x
Courses
Friends and business contacts x
Colleagues x

What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project? (general info on technologies, saving potential, economical incitements, guidelines, calculation tools etc.)
calculations

Other people in the project organisation (se below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)
Project leader, your organisation 2
Technical staff, in your organisation general 1
Building owner
Technical support staff in building (caretaker), other maintenance staff
Building user, leader (principle etc.), general user (teacher, employees)
Public administrator networks
Technical Consultants
Building contractor

What kind of information do they need? (read to the respondent) (prioritise, and specify who)
Energy saving potential
Statistics
Cost, loans and other incitements x
Cost – benefit, economy (investments, savings, maintenance) x
Short information, overview
Principle sketches
Designing information
Calculation advice
Knowledge about possibilities

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
yes

Do you have information about the energy saving potentials of innovative technologies?
yes

Do you know about guidelines on innovative energy saving and renewable energy technologies?
yes

If yes: How do you get these guidelines?
Web-pages, free (examples?) x
Subscriptions, (by post), what kind?
Subscription, internet based versions x
Call on demand – infocentre, etc (where?)
Publisher. Bookstore, institute, institute sales office?
Others?

What are the barriers for not know/get this guidelines:
Don't know where to search
Too expensive
don't know about any web-page
don't have subscription /not member, x
too expensive subscription
others

Where would you normally search for guidelines in general?
internet

How can we best give you and others information and help on innovative energy saving and renewable energy technologies?
By e-mail

Do you think it is hard to be updated on energy efficient solutions, and if so, what is the main reason why you don't have updated knowledge/information?
little time to keep up to date
don't naturally get across this information, x
Hard to search for information, x
hard to know when new info is available x
don't know about the distributor of information. x
don't read the right magazine,
don't seek for information, only pick up "what falls on your noze"

Interviewee LT5:
The interviewed person and his/her role:
Male/female? Male
Age? 28
What is your position in the organisation, and what is your function?
I am construction project manager. My functions are construction process organisation and control.

Retrofit innovation, low energy solutions, general
What kind of solutions do you think of as innovative energy saving and renewable energy technologies?
(alternatives, help for the interviewer, mark with "x")
x Innovative insulation
x High – efficient windows
x Hybrid ventilation
Improved day lighting
x Absorption cooling (solar assistant cooling)

x Reduce of overheating, using building mass and shading (passive)
Heat pumps
x Solar thermal collectors
x Passive Solar gains
PV-integration
LCA
Others: specify

Who in your organisation has an overview of innovative energy saving and renewable energy technologies for buildings/retrofit projects?
Each project manager has common understanding abou energy saving technologies.

Do you have a policy for applying these kinds of solutions, or do you use more standard solutions?
We try to apply these solutions.

If you apply some of these technologies, which ones?
We use facades thermical insulation and mixed ventiliation.

What is the main reason for choosing (not choosing) an innovative energy saving and renewable energy technologies in your building projects?
Technical requirements for construction elements and engineering systems.

H2 – Economy
Energy saving solutions often require high investment cost in the first year, and the savings will show in the following years. Is this a problem to your budgets? (If yes, do you have ideas for a solution?)
Yes. Government and municipality support is needed.

Are the investment costs or the total lifecycle cost basis for the decision process?
Yes.

Who can decide on using economical more expensive investments if they have reasonable payback time according to energy savings? (Political decision or technical decision, others)
Political and technical decisions.

Do you know about any economical incentives for choosing an innovative energy saving and renewable energy technologies? (loan, subsidy, potential reduced energy bills, others).
I don‘t know.

Do you know where to get this kind of information?
I don‘t know.

H3 – Organisation
Do you have special/defined staff that works with building retrofit projects? Size? (Number of employees)
Yes. 3

Who will have the main responsibility for a retrofit project? Technical staff in your organisation, building "owner" (principal, priest, nursing home manager) or a hired consultant?
Technical department, consultant from outside.

When is, to your opinion, the most important time/phase in the project for discussing the use of innovative energy saving and renewable energy technologies? Design and construction processes.

Who will have the main responsibility for choosing energy friendly solutions?
Savininkas.

Do you have networks etc. with other municipalities/universities/organisations where you can discuss experience and knowledge on innovative energy saving and renewable energy technologies?
Yes, we have (universities and organisations).

H1 -Information
How do you normally hear about innovative energy saving and renewable energy technologies?
Magazines, seminars.

What kind of information do you get? (advertisement, magazines, guidelines, statistics, newsletters etc)
Magazines.

Where do you normally search for information?

	Research institutes
	Library (guidelines and books)
x	Google
x	Special web-sites (specify)
x	Magazines, technical or others
	Associations: magazine, web-site, member bookstore
	Teaching materials, textbooks
	Conferenses
	Courses
x	Friends and business contacts
x	Colleagues

What kind of information about innovative energy saving and renewable energy technologies would you like in the decision making phase of the project?
general info on technologies, economical incitements

Other people in the project organisation (see below) can need other kind of knowledge than you about these solutions in this phase. Who is, to your opinion, the most important to give information (Number in order of priority)

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	Technical staff, in your organisation general
1	Building owner
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Building user, leader (principle etc.), general user (teacher, employees)
Public administrator networks
Technical Consultants
4 Building contractor

What kind of information do they need? (read to the respondent) (prioritise, and specify who)
x Energy saving potential
Statistics
Cost, loans and other incitements
x Cost – benefit, economy (investments, savings, maintenance)
Short information, overview
Principle sketches
x Designing information
x Calculation advice
Knowledge about possibilities

Do you use any kind of energy statistics, energy reports, or news magazine about energy solutions?
Yes.

Do you have information about the energy saving potentials of innovative technologies?
Yes.

If yes, is this information available? Where?
information of partner organisations, colleagues, technical journals and advertisiments.

Do you know about guidelines on innovative energy saving and renewable energy technologies? Yes.

If yes: How do you get these guidelines?
x Web-pages, free (examples?)
Subscriptions, (by post), what kind?
x Subscription, internet based versions
Call on demand – infocentre, etc (where?)
x Publisher. Bookstore, institute, institute sales office?
Others?

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Where would you normally search for guidelines in general?
Internet.

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Sending by e-mails.

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don't seek for information, only pick up "what falls on your noze"