

Project IEE/09/841/SI2.558360 Start: 01/09/2010

## **Deliverable 4.2**

### **Plan for training delivery in each country**

**Due date : 2011-06-31 (m10)**

**Actual submission date : 2012-03-30**

**Lead participant : Aalto University – Finland**

**Partners :**

Aalto University Professional Development, Aalto PRO - Coordinator

Building Research Establishment Ltd (BRE), United Kingdom

Debreceni Egyetem (UD), Hungary

Technische Universität München (TUM), Germany

Sabaté associats Arquitectura I Sostenibilitat (SaAS), Spain

Universität Augsburg (UA), Germany

AGFW-Projektgesellschaft für Rationalisierung, Information und Standardisierung mbH (AGFW), Germany

Dissemination level		
PU	Public	<b>X</b>
CO	Confidential, only for members of the consortium (including the Commission Services)	

*The sole responsibility for the content of this presentation lies with the authors.*

*It does not necessarily reflect the opinion of the European Union.*

*The European Commission is not responsible for any use that may be made of the information contained therein.*

---

## Table of contents

---

<b>1. Summary</b> .....	<b>3</b>
<b>2. Finland: Energy in Urban and Regional Planning</b> .....	<b>4</b>
2.1 General training principles .....	4
2.2 Module specific objectives, contents and training methods .....	5
<b>3. Spain: Energy and Urbanism</b> .....	<b>9</b>
3.1 General training principles .....	9
3.2 Module specific objectives, contents and training methods .....	10
<b>4. Hungary</b> .....	<b>12</b>
4.1 General training principles .....	12
4.2 Module specific objectives, contents and training methods .....	13
<b>5. Germany: Der Zertifizierte Energieeffiziente Stadtplaner</b> .....	<b>15</b>
5.1 General training principles .....	15
5.2 Module specific objectives, contents and training methods .....	15

## **1. SUMMARY**

---

This deliverable describes the long term pilot trainings' delivery practices in four partner countries, Finland, Spain, Hungary and Germany. This document contains information on name of the program, training contents, training methods, experts used in the trainings, extent of the pilot programs.

The training contents have similarities: all are formed in modular structure, same modules are trained in the countries and the participants of the courses are all practicing professionals. In Finland, and Hungary the training is run by university, in Spain and Germany by the partner organisation in cooperation with a professional body, in Germany with cooperation with two universities.

---

## 2. FINLAND: ENERGY IN URBAN AND REGIONAL PLANNING

---

In Finland the pilot training ('Energy in Urban and Regional Planning', in Finnish 'Energia yhdyskuntasuunnittelussa') started 17.10.2011. The participants are mainly from urban planning: the city planning offices (11 participants), the regional councils (5 participants), the urban planning consultants (3 participants) and the regional centres of economy, traffic and environment (3 participants) and Helsinki Region Environmental Services Authority (2 participants) and one student of architecture from Aalto University. The training will finish on 12.6.2012.

In Finland the team responsible for the training consists of four persons (energy expert, pedagogical expert, urban and regional planning expert(s) and course assistant), other resources are used when needed. The training progress is reported to the Finnish NSG.

The program is structured in 8 modules:

Module 1: Targets and Policies of Emission Reduction

Module 2: Buildings – new and old

Module 3: Fuels and Emission Calculation

Module 4: Energy Systems with Networks and Related Emissions

Module 5: Local Energy Systems

Module 6: Economy of RES and EE

Module 7: Transportation and Traffic related to EE & RES and Emissions

Module 8: Applications and Future

Each module consists of two training days, length of each day is from 9-16. In addition to the training days students work on their project work both individually and as groups. The scope of training is about 10-15 ECTS.

Basic information on the training can be found [aaltopro.fi/eys](http://aaltopro.fi/eys)

### 2.1 General training principles

1. In each module the training is focused on RES and EE but with the urban planning view point
2. There is a learning facilitator in each module. The facilitator is a representative of Aalto University or an expert whose competence brings relevant viewpoints to the module. The facilitator encourages discussion in the group, tutors group work assignments and other learning activity and ensures fluent delivery of training.
4. Excursions to nearby energy facilities and advanced urban planning cases will be organized to provide practical understanding of the RES and EE issues.
5. Individual skills in team working and understanding of spatial planning related to RES and EE issues will be provided.
6. Distance learning platform (Moodle, <https://moodle.aalto.fi/course/view.php?id=268>) will be used throughout the program especially to guide the Project Work and to share learning materials.
7. Project work will be done in the groups of 5-6 students. The objective is to apply learning into a practical planning case or working practice. Each group has their own expert tutor supporting the project work. The group work reports will be published and presented in the two last modules (module 7 and 8) but to partly different audiences.
8. A voluntary long excursion abroad will be organized in April 2012. The initial plan is to cover interesting RES and EE locations in Germany during 3-4 days.
9. After each module completed, the participants are requested to provide feedback on the completed module. This is done electronically using Webpropl-system.

---

In the training Aalto PRO will use experts both from Aalto University (professors and other teachers), private sector, research organisations and other that have the best competence for the specific topic. All the experts are encouraged to use communicative training methods.

## 2.2 Module specific objectives, contents and training methods

### **Module 1: Targets and Policies of Emission Reduction**

(17-18.10.2011)

#### Objective

The objective of the Module is to obtain the general view and deeper motivation to RES and EE as a means to mitigate the Climate Chance.

#### Contents:

- Planning as a tool for energy efficient and human built environment
- Viewpoints to climate change
- Built environment's carbon footprint
- Promoting sustainable development in built environment
- International aspect: objectives to reduce energy consumption and emissions
- introducing the project work for groups

#### Methodology:

- introduction of participants and the course
- lectures and presentations
- facilitated group work
- discussions on the lecture topics

### **Module 2: Buildings – new and old**

(14-15.11.2011)

#### Objective

The objective of the Module is to understand the needs, measures and barriers related to reduction of energy consumption and introduction of RES in buildings as a means to mitigate the Climate Chance.

#### Contents:

- Methods to improve energy efficiency in buildings
- Energy efficiency objectives for buildings
- Lightning solutions in urban environments
- promoting energy efficiency in refurbishing

#### Methodology

- Excursion to the Jätkäsaari eco city in Helsinki.
- lectures
- discussions
- calculations on energy consumption

### **Module 3: Fuels and Emission Calculation**

(12-13.12.2011)

#### Objective

---

The objective of the Module is to understand the emission calculation related to various fuels and wastes, combustion and processing methods and flue gas cleaning systems.

#### Contents

- air quality and the sources of pollutants
- local energy assessment/inspection
- sustainable land use
- Collection and processing of municipal waste to energy

#### Methodology

- local excursion
- Lectures and discussions
- calculation exercises

### **Module 4: Cities: Energy Systems and Emissions**

(16.-17.1.2012)

#### Objective

The objective of the Module is to understand energy systems in cities and the possibilities of DHC

#### Contents

- District heating and cooling: requirements and restrictions today and in the future
- Case Skaftkärr in the city of Porvoo Methodology

#### Methodology

- Lectures and presentations
- "project work clinic" (facilitated working method to support participants' project work)
- group exercise
- mid-term evaluation discussion

### **Module 5: Local Energy Systems in scattered urban areas**

(13.-14.2.2012)

#### Objective

The objective of the Module is to understand the opportunities and requirements of local energy systems in urban and rural areas.

#### Contents

- renewable energy sources
- local economy
- local energy solutions
- wind energy

#### Methodology

- group work on renewable energy sources
- presentations
- panel discussion

### **Module 6: Economy of RES and EE**

(12.-13.3.2012 )

---

## Objective

The objective of the Module is to understand the economy of various RES and EE measures relative to the traditional technologies by means of life cycle analyses from both the economic and financial points of view.

## Contents

- sustainable urban environment from energy and emission viewpoint
- CHP economy
- excursion to Helsinki Energy CHP plant
- use of geological information in planning

## Methodology

- lectures
- excursion
- calculation exercises

## **Module 7: Transportation and Traffic related to EE &RES and Emissions**

(21-22.5.2012)

### Objective

The objective of the Module is to understand the economy and ecology of various methods of transportation of goods and people today and in the future as an input to urban planning

### Contents

- why and how we move?
- Energy consumption, economy and RES use per type of transportation
- car sharing experiences
- advanced liquid and gaseous bio fuels for transportation
- Requirements set by electric cars to urban infrastructure
- Advanced transportation experiences from USA

### Methodology

- Lectures and presentations
- local excursion to Helsinki region transport

## **Module 8: Applications and Future**

(05.-06.6.2012)

### Objective

The objective of the Module is to take view to the future of energy and urban planning as a summarizing activity as well as to provide concluding presentations of the Project Work by the five groups. The second day will be an open seminar day, where Aalto PRO will invite NSG members and other interest groups.

### Contents

- Conclusions and consequences of the Energy Program of Sitra
- Transferring the Energy Impact Assessment to urban and regional planning as a new permanent practise
- Feed-back discussions of the course
- Models of eco city in Finland and abroad

- 
- Presentation of group works to the extended audience

#### Methodology

- Lectures
- participant project case presentations

#### **Voluntary Excursion to Germany 10.-13.4.2012 (participants pay the travel themselves)**

Preliminary program is as follows:

##### Tuesday 10.4

- travelling day
- Visit to Berlin city planning department

##### Wednesday 11.4.

- Project Ökokiez 2020
- Energy efficient concert house
- Germany's largest low-energy area

##### Thursday 12.4

- visit to Freiburg that is a leading city in sustainable development and sustainable urban planning

##### Friday 13.4.

- travelling day



---

## 3. SPAIN: ENERGY AND URBANISM

---

In Spain, the pilot training (“Energy and Urbanism”) started 24.10.2011 and will end by 06.06.2012.

The course was conceived by Sabaté associats (Joan Sabaté and Christoph Peters) and the main outlines were agreed with the UP-RES Consortium in the frame of the General Meeting in Barcelona.

The program is structured in 10 modules. The sequence of the modules was fixed with the objective to first establish a common base of general knowledge among the students concerning sustainability and energy in urban planning (Modules 1+2), then to focus on the main energy consumers in cities, buildings and mobility (Modules 3+4), then to enter passive design strategies in urban planning (Module 5) and main renewable energy technologies (Module 6) before dedicating the last four modules to new energy distribution and management concepts and their practical implementation.

The overall leadership as well as the coordination of most of the modules are under the responsibility of SaAS (Christoph Peters). Some of the modules are coordinated by external experts (M 4 / 5 / 7 / 8). The modules have a duration of 12 to 18 hours in a regular training on Mondays and Wednesdays between 6:30 and 9:30 pm. In addition to the training days students work on different exercises, both individually and as groups. The scope of training is about 10-12 ECTS.

Annex 1 gives a program overview containing duration and dates of the modules, content, as well as the names of the coordinators of the different modules and the facilitators for each session. The detailed program can be found on <http://escolasert.coac.net> following the link in “POSTGRAU en Energia i Urbanisme” (Catalan) and is also attached to this deliverable (Spanish).

Students can subscribe either for the whole course or only for selected modules. The pilot training counts on 27 students for the entire course, and between 3 and 10 additional students for specific modules (M1: 6 / M2: 5 / M3: 10 / M4: 3 / M5: 5 / M6: 4), so that the overall number per module was between 30 and 37 students, with an average of 32.5 students until date.

The participants are architects and one civil engineer and in their majority coming from urban planning: municipalities, public development agencies, urban planning consultancies but also an important number is jobless due to the severe economic crisis in Spain, taking advantage of the situation to achieve professional development. Some of the students have already done a master course in either Urban Planning or Sustainable Architecture, others don't count on any additional education apart from their professional experience.

### 3.1 General training principles

1. In each module the training is focused on EE and RES as much as possible under the urban planning view point.
2. There is a learning facilitator in each module to the extent that the total of 50 afternoon sessions are tutored by 36 different experts of the specific field of knowledge of that session. The facilitator gives a face-to-face presentation to teach the basic content and where applicable calculation methods, informs about latest developments, brings relevant viewpoints to the module and encourages reflection and discussion among the group members. The big majority of facilitators are practising professionals, only a few ones are professors from nearby Universities. In any case, the best Catalan experts have been chosen for every module and session. The director of the training, Christoph Peters, is present in all of the sessions to give continuity to the training and confidence to the group, to ensure fluent delivery, as well as to detect pros and cons for specific contents, learning methods or experts. Two teaching assistants are continuously reviewing technical aspects and doing the follow-up between experts and the teaching entity, Escola Sert.
4. Excursions to nearby energy facilities are organized to provide practical understanding of the RES and EE issues.
5. Individual skills in team working and understanding of spatial planning related to RES and EE issues will be provided.
6. All sessions are transmitted in-time via the distance learning platform *moodle* which is regularly used by three students coming from outside the Barcelona Metropolitan Area.

7. All sessions are recorded on video and are available on the e-learning platform of the training. This is of special use for students that are not able to attend particular sessions.

8. Project work is done in some of the modules, normally in groups of 3 students. The objective is to apply learning into a practical planning case or working practice. The e-forum is available for discussions among the students and suggestions by the coordinator and his experts of the specific session. The group work is delivered some days before the end of the respective module and is corrected and discussed in the final session of each module.

9. Participation of the students is checked in every session by their signature. At the end of the course, the students that followed more than 80% of the sessions and passed all of the exercises will receive a diploma stating their successful participation.

10. After every session, the students evaluate the content and the capacity of the facilitator in a standardized questionnaire which allows a strict follow-up of the quality of the facilitators.

### 3.2 Module specific objectives, contents and training methods

The module specific objectives are the following

Module 1: An integrated vision. Sustainability in regional and urban planning

- current spatial and urban planning framework in Spain and particularly in Catalonia and the many different aspects of sustainability and its possible influence on urban planning.

Module 2: Energy. The existing energy model and market outlook

- consequences of the current energy model, its foreseen development on global level as well as particularly in Catalonia, and the existing energy transformation technologies.

Module 3: Buildings. Energy demand reduction strategies in new buildings and refurbishment

- parameters influencing the buildings' energy demand and the potential energy savings with special focus on zero energy buildings and deep renovation. The module provides an introduction to each measure / technology and opens space for discussion showing energy simulations and monitoring results of existing buildings.

Module 4: Mobility. Energy consumption reduction strategies in urban and interurban mobility

- trends in urban mobility (opportunities in the implementation of urban mobility plans, sustainable development plans, etc. )

Module 5: Urban planning. Energy demand reduction strategies in the urban metabolism

- parameters influencing the energy demand of the city as a whole and the energy savings potential at every planning level with particular focus on demand reduction.

Module 6: Energy resources. Renewable energy technologies in the urban scale

- resources, technologies, applications, limitations, integration into energy concepts at different level, market situation and economic feasibility of different renewable energy technologies

Module 7: Energy distribution: District Heating and Cooling

- advantages and operation of heating and cooling networks as well as technical design parameters and business plans for their implementation.

Module 8: New management concepts in the energy market

- outsourcing of energy generation and management. New concepts for energy measuring and interaction between energy demand and supply.

Module 9: Energy management. New models in contracting and management

- 
- experiences in economic, financial and contractual models for DHC networks in Catalonia (Barcelona – Forum, Barcelona – Marina, Mataró, Cerdanyola) and other European regions that count on decades of implementation of this technology.

Module 10: Workshop. The right scale for every energy concept

- advantages and limitations of different energy concept implementation levels and the parameters influencing the selection: demand density, RES supply potential, distribution, etc. Application of basic tools for heat and cold mapping.

Specific exercises are to be developed in groups of three students in the modules 3,5,7 and 10.

---

## 4. HUNGARY

---

### 4.1 General training principles

Debrecen University launched a formal accreditation procedure in 2010. The accreditation document (according to the legal procedure) consisted the list of disciplines, the number of credits, the name of the responsible professor for each discipline, the aim of the programme, the preconditions of the participation. Capacity of the university regarding qualified teaching staff, laboratories and infrastructure had to be proven, too.

The approval of the ministerial bodies (Hungarian Accreditation Committee and Office of Education) has been received. It means that the long term training is a normal postgraduate university training with 60 credits and postgraduate diploma on "Urban Energetics". At the same time the approval of the postgraduate course means that any other Hungarian university has the right to announce this course with the same programme providing it disposes of qualified teaching staff and infrastructure.

Because in Hungary the urban planners are not employed by the local authorities but work for consultancy bureaus and design studios they need more knowledge on fundamentals and have to prove their skills on the market with a serious document, which is an additional university degree (besides of their original one). This is why our course is a longer complete course with the same scheme, credits and type of diploma as the other specific postgraduate courses.

The long course is hosted by the University of Debrecen. The course consists of lectures, classes, laboratories for two complete days (10 hours each) every second week. Also site visits, exams, homework and distance consultations are used. The course lasts two semesters, followed by final exams, presentation of diploma works and viva voce; scope of the course is 60 credits.

Participants are mainly architects, mechanical, electrical, civil and building engineers, already working or intending to work for local authorities. The University of Debrecen aimed at getting 30 participants to the pilot training course. For marketing emails, radio interviews, newspaper articles and websites have been used. The course announcement will was published on the homepage of the Ministry of Interior. Nevertheless in September 2011 we started only with 16 students. Among the reasons of this low number not only the novelty of this brand new profile should be mentioned: the main problem is that the government radically reorganizes the country. The local authorities lose their properties and rights, instead of them a chain of about 130 regional governmental offices will be the owners and the decision makers. As a consequence obscurity is typical, the local authorities are less or not at all interested in perspective whilst the regional offices are still being established.

Obviously the course became organic part of the program of the university and will be announced in the forthcoming academic years.

The overview of the long course disciplines and the names of the can be seen in the following table:

Module	Discipline	semester	professor	credit
Fundamental	Energy demand management	1	Dr. Kalmar, Ferenc college professor	4
	Fundamentals of urban design	1	DLA Puhl, Antal professor	4
	City management	1	Dr. Csomos, Gyorgy asociated professor	6
	Urban climatology	1	Dr. Szegedi, Sandor associated professor	4
Specific	Energy conscious building retrofit	1	Dr. Csoknyai, Tamas associated professor	4
	Environmental protection	1	Dr. Bodnar, Ildiko college professor	8
	Power supply	2	Dr. Tóth, János associated professor.	4
	District heating and cooling	2	Dr. Csoknyai, Tamas associated professor	4
	Geothermal energy	2	Dr. Kalmar, Ferenc college professor	8
	Solar energy	2	Dr. Zold, Andras professor	4
Diploma project		2		10

## 4.2 Module specific objectives, contents and training methods

Comments to the disciplines

### *Energy demand management*

Energy market, tariff systems, tasks of local authorities, follow-up the energy bills, statistical analysis of consumption data, methods of audit, display program of public buildings. Practice with infra camera, blower door and other instruments.

### *Fundamentals of urban design*

The development of urban settlements, historical city centres, new districts of multi-storey residential buildings built with industrialised technology, climate friendly cities, sustainable settlements.

### *City management*

Hierarchy of decision making, professional institutes, infrastructure, public transport, subsidised programs, actual national and EU tenders.

### *Urban climatology*

Mutual interactions of climate and built environment, urban heat island, wind patterns in cities, urban breeze, problem of precipitation, role of green areas, comfort conditions in open public spaces

### *Energy conscious building retrofit*

Diagnostic techniques, GIS methods, application of air borne infra and photo recording in the surveying of solar potential, added thermal insulation, retrofit of HVAC systems.

### *Environmental protection*

Emission, air pollution – propagation, concentration, waste management, biogas generation, water and sewage management, thermal water, environmental impact of the use of geothermal energy. Laboratory practice.

*Power supply*

Photovoltaic systems, large and small scale wind turbines, automatic control, intelligent buildings, street-lighting

*District heating and cooling*

Combined heat and power generation, gas and Stirling engines, biomass and biogas, seasonal storage, primary, secondary and tertiary circuits, smart metering.

*Geothermal energy*

Geologic conditions, thermal waters, bore holes, energy collecting piles, heat pumps, COP, distribution network, heat losses, circulation pumps, automatic control.

*Solar energy*

Solar energy potential in densely built urban environment, the available energy collecting area, the share of the on-site renewable energy, collector types, energy storage.

*Diploma project*

Selected and approved topics: this year e.g. energy conscious building retrofit on district scale, indicators of sustainable settlements, energy analysis of the public transport network of Debrecen, solar potential of the "Kelenfold" district Budapest, heat pump system, application of Stirling engine in a district heating system, photovoltaic power generation, hydraulic balancing of district heating network, etc.

---

## 5. GERMANY: DER ZERTIFIZIERTE ENERGIEEFFICIENTE STADTPLANER

---

### 5.1 General training principles

In Germany the pilot training will start in June 2012 and finish in June 2013. It will be offered in cooperation with the German Institute for Urban Studies (Difu). The goal is to provide an initial and continuing professional training at the interface between concepts of urban planning and supply/waste management by teaching professional content and parameters.

The program is structured in 8 modules:

- Module 1: Basics and Introduction to the System of City and Technical Infrastructure
- Module 2: Basic Conditions and Characteristics of Energy and Energy Efficiency
- Module 3: Physical and Technical Background / Forms of Energy / Energy Sources / Buildings
- Module 4: Definitions and Fields of Application/ Application Limits of RES
- Module 5: Basic Economic Data
- Module 6: Creating a Concept
- Module 7: Legal Framework for the Implementation of Energy and Climate Policy, as well as Urban Planning related Objectives
- Module 8: Implementation measures - Best and Worst Practice with Examples

Each module consists of two days with 8 hours per day. In addition, the students will do individually homework and take part in an excursion.

The main target group for the German pilot training are participants from municipalities, especially urban planners and developers, participants from environmental offices and building authorities, self-employed planners and architects, as well as employees of the local utilities.

### 5.2 Module specific objectives, contents and training methods

#### **Module 1: Basics and Introduction to the System of City and Technical Infrastructure** (June 2012)

The first module focuses on the urban development planning with regard to technical infrastructure. In addition to important definitions, both the historical development of urban planning and the infrastructure will be presented from an energetic point of view. The current situation of energy efficient urban development will be showed, as well as future challenges.

Contents:

- Definitions
- Historical development
- Development of urban planning, including the technical infrastructure
- Current situation
- Urban redevelopment/ mechanisms of urban development
- 8 pillars of sustainable urban planning
  - Decentralised concentration and demography
  - Strategy and processes
  - Density and mixture

- 
- Identity and general principle
  - Efficient and intelligent urban infrastructure
  - Existing buildings
  - Environment and landscape
  - Mobility
  - 5 strategies for energy efficient urban development:
    - The “compact city”
    - Living in the city - for young and old
    - Monument conservation - energy efficiency
    - Target-orientated funding
    - Innovative energy concepts - prioritization of funds usage
  - Future challenges
    - Megacities
    - Metropolitan regions
    - Scenarios of negative growth

Methodology:

- Lectures and presentations
- Discussions on the lecture topics

**Module 2: Basic Conditions and Characteristics of Energy and Energy Efficiency**

(September 2012)

To ensure an energy efficient urban development, the basic conditions must be known. Therefore, the basics of energy markets and the political conditions have to be considered more detailed. In the context of energy and energy efficiency, environmental issues, such as climate change and CO<sub>2</sub> emissions, are of major importance. Furthermore, the influence of demography on urban development is discussed in the second module. The knowledge of funding mechanisms, the interplay between different actors and the associated problems is necessary to ensure the success of energy efficient urban development planning.

Contents:

- Energy markets
  - Reserves and resources
  - Security of supply, flexibility, consumption
- Political framework
  - Targets and implementation guidelines of the EU and Germany
  - Structural policy
  - Urban development funding
  - “Leipzig Charta”
  - Program for the national urban development policy
- Urban identity and general principle
  - Needs and objectives
  - Interaction and restraints
  - Public relations and communication
- Environment



- 
- Climate changes/ climate models
  - Heat/ climate control
  - CO<sub>2</sub> effects and GHG
  - Influences and packages of measures regarding technical infrastructure (active, reactive)
  - Factors of interpretation
  - Demography
    - Statistics, living space, lifestyles, socio-demographic factors, effects
  - Funding and mechanisms
    - Overview, system and design, effects

Methodology:

- Lectures and presentations
- Discussions on the lecture topics

### **Module 3: Physical and Technical Background / Forms of Energy / Energy Sources / Buildings**

(November 2012)

This module contains the description of the various energy forms and sources. The issue of "cold supply" is included here because it will gain increasing importance due to climate change in future. Energy production and conversion, energy transportation, energy distribution and storage options are considered as well.

Contents:

- Fossil fuels (oil/ gas/ coal)
- RES
- Residual waste
- Cooling systems
- Forms of conversion – district heating - CHP
- Power plants – grids – building services
- Energy storage
- Buildings
  - Heat demand (actual /future)
  - Renovation strategy
- Use of GIS

Methodology:

- Lectures and presentations
- Discussions on the lecture topics

### **Module 4: Definitions and Fields of Application/ Application Limits of RES**

(December 2012)

Renewable energy sources will play an increasing role in the future. Therefore, biomass, photovoltaics/ solar thermal, geothermal, wind and water will be discussed in detail. As another special form of renewable energy, the use of building materials and waste water heat recovery are presented.

Contents:

- 
- Biomass
    - Harvesting factors, agricultural conditions, climate changes, cycles
  - Photovoltaics/ solar thermal energy
    - Connection to central/ local grids, research results
  - Geothermal energy
    - Surfaces and deep geothermal
  - Wind
    - Locations and fields of application
  - Water
  - Utilization of waste heat
  - Special forms: building materials / waste water heat recovery
  - Conditions regarding locations
    - Clearance areas, immission control

Methodology:

- Lectures and presentations
- Discussions on the lecture topics
- Test for voluntary self-control

**Module 5: Basic Economic Data**

(January 2013)

In order to a better understanding of the modules 3 and 4, the basics of the energy industry are explained in the fifth module. International and national conditions of heat and electricity market, as well as knowledge of prices, costs, and the power exchange, are of great importance for an energy efficient urban development.

Contents:

- Framework
  - National and international
  - Heat and power
- Energy market
- Energy price
  - Price coupling
  - Interplay between systems
- Costs
  - Economic efficiency
  - Benchmark of systems
  - Investment cycles
  - Calculation methods and simulations
  - Sensitivity analysis
  - Profitability analysis/ weighting of parameters
- Electricity exchange
  - Mechanisms, time horizons

- 
- CO<sub>2</sub> abatement costs of different technologies (€/t CO<sub>2</sub>)

Methodology:

- Lectures and presentations
- Discussions on the lecture topics

### **Module 6: Creating a Concept**

(February/ March 2013)

Objectives, methodology and content of various concepts are illustrated in module 6. Of particular interest are the Integrated Urban Development Concept (InSek), the Energy Efficient Urban Development Concept (EneffSeko) and the Energy and Climate Protection Concept (IEuKK). To ensure a successful implementation, the knowledge about the different processes and process chains, running during the concept elaboration, is necessary.

Contents:

- InSek / EneffSeko
  - Methodology, contents, interaction, structure, measures
- IEuKK
  - Objectives and contents
  - Heating and Cooling Atlas
  - CO<sub>2</sub> balance
  - Funding
  - Scenarios
- Processes
  - Process chains, prioritisation, implementation measures
  - Ministry for Research and Technology (BMFT): Energy Efficient City
- Energy saving potentials
  - Hydraulic compensation
  - Thermal insulation
  - Energy efficiency systems
  - Evaluation methods and decision support
- Interaction of all concepts
- Quality assurance and monitoring
- Restructuring and heating concepts for different types of buildings
  - Practical information
  - Approaches for implementation
  - Funding opportunities

Methodology:

- Lectures and presentations
- Discussions on the lecture topics

### **Module 7: Legal Framework for the Implementation of Energy and Climate Policy, as well as Urban Planning related Objectives**

(April 2013)

---

The 7th Module presents an overview of the legal basics for energy efficient urban development. It is distinguished between European, federal, state and local levels. The funding opportunities at these different levels are shown.

Contents:

- European level
  - EFRE, EDL, EED
- Federal level
- Federal state level
- Local level
- Support Programs
- Contract law
- European awarding law
- Options for action for municipalities (possibly model contracts)
- Data protection
  - Mechanisms, solutions

Methodology:

- Lectures and presentations
- Discussions on the lecture topics
- Test for voluntary self-control
- Excursion (2<sup>nd</sup> day)

### **Module 8: Implementation measures - Best and Worst Practice with Examples**

(June 2013)

During this module all the contents of the modules 1 to 6 are illustrated in the form of "Best and Worst Practices".

Contents

- Best practice examples as collected in WP 2
- More specific, national examples

Methodology:

- Lectures and presentations
- Discussions on the lecture topics
- Group work

		Hours	Responsible
<b>M1</b>	<b>AN INTEGRATED VISION. SUSTAINABILITY IN REGIONAL AND URBAN PLANNING</b>	<b>15</b>	<b>Christoph Peters</b>
24.10.2011	Sustainability and ecological foot-print: energy / water / materials / waste in an urban context		C. Peters / J.Sabaté
26.10.2011	Existing regional and urban planning mechanism - integration of sustainability aspects - territory / multifunctionality		S. Jornet / D. Calatayud
2.11.2011	Management of the matter cycle: matter supply and waste evacuation and treatment		Lluís Grau
7.11.2011	Management of the water cycle: water supply of different qualities, rainwater management, grey and waste water treatment		Jordi Huguet
9.11.2011	Quality of life in an urban context: health, confort, security, others.		Elisabet Silvestre
<b>M2</b>	<b>ENERGY. THE EXISTING ENERGY MODEL AND MARKET OUTLOOK</b>	<b>12</b>	<b>Christoph Peters</b>
14.11.2011	End energy and primary energy - environmental impact - global developments and particularities of Catalonia		Joan Esteve
16.11.2011	Energy markets - prices and outlook of the electricity and thermal energy market		Carlota Pi
21.11.2011	Energy transformation technologies: heat / cold / electricity		Josep Maria Granollers
23.11.2011	Energy transformation technologies: cogeneration / heat activated cooling		Josep Maria Granollers
<b>M3</b>	<b>BUILDINGS. ENERGY DEMAND REDUCTION STRATEGIES IN NEW BUILDINGS AND REFURBISHMENT</b>	<b>15</b>	<b>Christoph Peters</b>
28.11.2011	Life cycle analysis: The material's embodied energy and associated environmental impact. Strategies for impact reduction, materials from the biosphere.		C. Peters / J.Sabaté
30.11.2011	Energy demand reduction strategies on the building level: potential and measures. Thermal inertia - insulation - solar control - ventilation - lighting		C. Peters / J.Sabaté
12.12.2011	Energy refurbishment (technical, thermal and hygrothermal aspects, legal and financial aspects, processes and methodologies)		C. Peters / J.Sabaté
14.12.2011	Energy consumption reduction strategies: efficient installations in end user devices and air treatment, distribution and supply side		C. Peters / J.Sabaté
19.12.2011	Visit of the Net Zero Energy Building LIMA prototype, Campus La Salle - University Ramon Llull and its energy monitoring equipment		C. Peters / J.Sabaté
<b>M4</b>	<b>MOBILITY. ENERGY CONSUMPTION REDUCTION STRATEGIES IN URBAN AND INTERURBAN MOBILITY</b>	<b>12</b>	<b>Jordi Castells</b>
9.1.2012	Energy consumption and reduction potential - environmental impact evaluation tools (CORINAIR, COPERT IV, etc.)		Jordi Castells
11.1.2012	Electric vehicles - implementation models, recharging infrastructures and consequences for the electricity network		Xavier Amores
16.1.2012	Smart mobility - dynamic and intelligent responses to mobility fluxes, demand and environmental pollution (planning instruments)		Lluís Alegre
18.1.2012	Smart logistics - tracking of good transportation, segments and main actors in the logistic chain, urban distribution models, micro distribution platforms		Cristina Pou
<b>M5</b>	<b>URBAN PLANNING. ENERGY DEMAND REDUCTION STRATEGIES IN THE URBAN METABOLISM</b>	<b>15</b>	<b>Sebastià Jornet</b>
25.1.2012	Instruments for energy management in urban planning; exercise description		Sebastià Jornet
30.1.2012	Influence of the urban model on energy consumption and sustainability: European examples (BEDZED, Vrin, Ludech)		S. Jornet / J.L.Oyon
1.2.2012	Strategies for urban metabolism reduction: Catalan examples (12+1/Vacarisses, barri del Llevant, Figueres)		I. Muñoz / D.Calatayud
6.2.2012	Integration of Renewable Energies Technologies for meeting the demand: strategies and the examples of Vallbona, Barcelona		D.Calatayud / A.Cuchí
8.2.2012	Round table on tools and instruments for energy reduction in urban planning, presentation and discussion of exercise results		S.Jornet / all previous
<b>M6</b>	<b>ENERGY RESOURCES. RENEWABLE ENERGY TECNOLOGIES IN THE URBAN SCALE</b>	<b>18</b>	<b>Christoph Peters</b>
13.2.2012	Solar photovoltaics - tecnologia and legal framework, systems, integration in urban infrastructure		Xavier Vallvé
15.2.2012	Solar thermal energy - tecnologia and legal framework, systems, integration in urban infrastructure		Jaume Serrasolses
20.2.2012	Solar cooling - tecnologia and legal framework, systems, integration in urban infrastructure		Oriol Gavaldá
22.2.2012	Geothermal energy - tecnologia and legal framework, systems, integration in urban infrastructure		Bartomeu Casals
27.2.2012	Biomass / solid urban waste - tecnologia and legal framework, systems, integration in urban infrastructure		Pasqual Calafell
29.2.2012	Site visit - two social housing projects with different thermal approach and integration of renewable energy systems for heating and cooling in Mataró		Lluís Grau
<b>M7</b>	<b>ENERGY DISTRIBUTION: DISTRICT HEATING AND COOLING</b>	<b>15</b>	<b>Àngel Andreu</b>
5.3.2012	District energy networks - advantages and limitations - exploitation and contractual models		Àngel Andreu
7.3.2012	Economic and financial models - Short term financing, Balancing, Income and costs, payback rates, etc.		David Serrano
12.3.2012	Technical design of district energy networks		Marcos Pérez
14.3.2012	Site visit: Districlima, 22@, Barcelona Forum - urban waste incineration - cooling by absorption - seawater heat exchange		David Serrano
21.3.2012	Presentation and discussion of exercise		Àngel Andreu
<b>M8</b>	<b>NEW MANAGEMENT CONCEPTS IN THE ENERGY MARKET</b>	<b>18</b>	<b>Roger Marcos</b>
26.3.2012	Energy Service Companies (I) - Legal and contractual aspects		R. Marcos / D. Sanz
28.3.2012	Nous models de servei impulsat per la ciutat de Barcelona		Manel Torrent
11.4.2012	Energy Service Companies (II) - The role of the public administration - local and international examples		R.Marcos / F. Aranda
16.4.2012	Projecte i experiències en nous conceptes energètics		Narcís Armengol
18.4.2012	Energy Service Companies (III) - Financing mechanisms - Protocols of measurement and verification of savings		Joan Vidal
25.4.2012	Intelligent use of energy information in buildings: energy information processing and display, necessity of training New possibilities of control and regulations and energy invoicing - diferent service models, occupancy detection by radiofrequency		Circuitor / Schneider Electric
<b>M9</b>	<b>ENERGY MANAGEMENT. NEW MODELS IN CONTRACTING AND MANAGEMENT</b>	<b>15</b>	<b>Christoph Peters</b>
2.5.2012	Parc de l'Alba, Cerdanyola del Vallès / Tub Verd, Mataró - Experiences in economic, financial and contractual models		F. Figueres / A. Vilert
7.5.2012	Districte 22@, Barcelona - Experiences in economic, financial and contractual models		David Serrano
9.5.2012	Districte de la Marina, Barcelona - Experiences in economic, financial and contractual models		Àngel Andreu
14.5.2012	International experiences in economic, financial and contractual models		Christoph Peters
16.5.2012	Site visit: districte de la Marina - Cold from depressurizing liquid gas, biomass heat in district heating and cooling		Àngel Andreu
<b>M10</b>	<b>WORKSHOP. THE RIGHT SCALE FOR EVERY ENERGY CONCEPT</b>	<b>15</b>	<b>Christoph Peters</b>
21.5.2012	Design of energy networks - different growth models at medium and long term, demand composition and aggregation of new area and urban revitalization		David Serrano
23.5.2012	Connected and disconnected, the right scal of centralization: stand-alone, building, neighbourhood, district, city, metropolitan area		J. Sabaté / C. Peters
30.5.2012	GIS (Geographic Information System) based applications for regional and urban energy planning		Expert
4.6.2012	Site visit: Headquarters of the 22@ Innovation District and Urban Revitalisation		Ramon Segarra
6.6.2012	Presentation and discussion of exercise - closure of the course		J. Sabaté / C. Peters

TOTAL 150