Urban Planners with Renewable Energy Skills – UP-RES

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Keywords: energy, emissions, climate change, education

Abstract

Missing link to energy and emissions

Traditionally, energy and emissions have not been integrated into the urban planning processes. Only in a very few planning schools in the world the spatial planners are educated with understanding on energy, and on renewable energy sources (RES) and energy efficiency (EE) in particular.

Relevance of the work to planning education

To fight Climate Change, however, such new understanding has become essential. The understanding may materialize in the following two ways:

• The energy experts and the urban planners shall start working together with all spatial development plans regardless existing or new building areas. In order to facilitate such co-working, training shall be provided to both types of professional to help them to understand each other.

• The training shall be extended to bachelor and master level education in parallel to the continued education of professionals.

UP-RES (Urban Planners with Renewable Energy Skills) Project as a part of the Intelligent Energy Europe framework programme provides pilot training to spatial and energy planners in five EU countries as well as material support to other universities to adopt such training into their curricula.

The training material designed to other planning schools in Europe will be made freely downloadable in 10 languages by mid July 2012 on the web page: http://aaltopro2.aalto.fi/projects/up-res/materials.html

Methodology

During 2012, the pilot training is carried out in five European countries, namely in Hungary, Spain, Germany, U.K. and in Finland, the latter being the country of the coordinator.

The project work started with the competence and training needs analysis. Based on the analysis, the training concept was designed specifically for each country. Practical examples and best practice cases of combined spatial and RES planning have been collected and used in the pilot training. Real cases have been identified in which win-win situations have been achieved when both the lifecycle costs and the emissions could be substantially reduced compared to the traditional way of spatial planning. The pilot training is underway during the period Oct. 2011 – June 2012.

Pilot Training Approach

The core of the training is the structure comprising ten modules. Each module typically comprises two days of training.

The module titles are as follows:

<table>
<thead>
<tr>
<th>Module</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>SUSTAINABILITY CONCEPTS IN REGIONAL AND URBAN PLANNING: A HOLISTIC VISION</td>
</tr>
<tr>
<td>M2</td>
<td>ENERGY. FORMS - TRANSFORMATION - MARKET OUTLOOK</td>
</tr>
<tr>
<td>M3</td>
<td>ENERGY DEMAND REDUCTION STRATEGIES: POTENTIAL IN URBAN PLANNING</td>
</tr>
<tr>
<td>M4</td>
<td>ENERGY DEMAND REDUCTION STRATEGIES: POTENTIAL IN NEW BUILDINGS AND REFURBISHMENT</td>
</tr>
<tr>
<td>M5</td>
<td>ENERGY RESOURCES AND RENEWABLE ENERGY TECHNOLOGIES</td>
</tr>
<tr>
<td>M6</td>
<td>ENERGY DISTRIBUTION: DISTRICT HEATING AND COOLING</td>
</tr>
<tr>
<td>M7</td>
<td>THE RIGHT SCALE FOR EVERY ENERGY CONCEPT: HEAT AND COOL DENSITY (DEMAND SIDE), POTENTIAL ON SUPPLY SIDE</td>
</tr>
<tr>
<td>M8</td>
<td>NEW MANAGEMENT CONCEPTS IN THE ENERGY MARKET</td>
</tr>
<tr>
<td>M9</td>
<td>ENERGY PLANNING</td>
</tr>
<tr>
<td>M10</td>
<td>NEW TRANSPORT MODELS AND URBAN AND INTER-URBAN MOBILITY</td>
</tr>
</tbody>
</table>

The above listed Modules will be described in the attached documents, including the objective, the main contents and the information sources available to design local training of the particular module.

Country Specific Differences

Designing and implementing the training heavily depends on the local circumstances, and therefore, has to be adjusted to the local needs and conditions. Therefore, various approaches were chosen in the five countries to implement the pilot training, as follows:

Finland:

• In Spring 2011 already, 7 one-day courses were organized in the cities of Espoo, Kuopio, Oulu, Turku, Tampere, Seinäjoki and Jyväskylä to market the long pilot training course.
• During Fall 2011-Spring 2012, a 9 months lasting course of 8 modules of two days each was organized for 26 urban and regional planners.
• Moreover, a voluntary excursion of three days to Germany was arranged.
Hungary:
1. By Summer 2011, 3 short courses were implemented.
2. The long course with as much as 60 ECTS credits was organized during Oct 2011-July 2012.

Germany:
1. Six short courses of 2 days each were organized in Germany with 182 participants in Dresden, Frankfurt, Munich, Hamburg, Chemnitz and Berlin.
2. The long course of 9 months was expected to start in June 2012.

Spain:
1. Four information days were organised in the Chamber of Architect’s regional headquarters in Girona, Tarragona and Barcelona.
2. The long course with 10 modules were implemented during Oct. 2011-June 2012. The long term course was structured in ten modules with an extension between 12 and 18 hours each.

United Kingdom:
1. In total 5 short courses of 3 days each were implemented in UK by February 2012 but more expected later on.
2. According to the project agreement, there will be no long courses in UK.

Structure of Training Material
The material at hand consists consists of the selected training materials of ten modules, for each of which a general description of the module objectives, approaches and the contents has been created. As annexes slides have been given to present some 3-5 key topics of the particular training module, some 300 slides altogether. Internet links have also been given for searching more information from the web in English language.

Methodologies of Training
In the pilot training several methodologies were applied, as follows:
1. Sometimes a facilitator was chosen for each module to link the learned energy issues to urban planning.
2. Lectures were based on slides and discussions.
3. Excursions both locally and internationally were organized to best practice locations.
4. Exercises were carried out by the trainees in small groups and individually about issues combining RES and EE to spatial planning.
5. Distant learning was used to reduce the need of travelling and to save time.
6. Movies were shown to trainees such as, for instance, Inconvenient Truth, District Cooling,
7. Expert panel, or expert clinic, advisory services were applied to support the trainees to carry out their exercises.

Example of Training Module
Here an example of the contents of a training module is presented. It has been a combination of team work, lecturers and an excursion, for example.

<table>
<thead>
<tr>
<th>M5</th>
<th>ENERGY RESOURCES AND RENEWABLE ENERGY TECHNOLOGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>1st Day: Familiarization with RES</td>
</tr>
<tr>
<td>9.00-9.15</td>
<td>Introduction to Module Topics</td>
</tr>
<tr>
<td>9.15-10.30</td>
<td>Presentation of RES technologies and applications</td>
</tr>
<tr>
<td>10.30-10.45</td>
<td>Break</td>
</tr>
<tr>
<td>10.45-12.00</td>
<td>Based on the presentation, five groups of trainees search for information from Internet. One group specifically for solar electric, solar heat, wind, biomass and the fifth group for waste energy.</td>
</tr>
<tr>
<td>12.00-12.45</td>
<td>Break</td>
</tr>
<tr>
<td>12.45-14.00</td>
<td>Five groups continue</td>
</tr>
<tr>
<td>14.00-14.15</td>
<td>Break</td>
</tr>
<tr>
<td>14.15-14.30</td>
<td>Presentation of the results of five group works</td>
</tr>
<tr>
<td>15.30-16.00</td>
<td>Conclusion</td>
</tr>
</tbody>
</table>

2nd Day: Rural Energy Supply

| Time       | 1st Day: Rural Energy Supply |
| 9.00-10.30 | Local economy; impacts of RES on rural economy and survival |
| 10.30-10.45| Break                        |
| 10.45-12.00| Off-grid village based on RES (Kempele, Finland) |
| 12.00-12.45| Break                        |
| 12.45-14.00| Agricultural waste to liquid fuel |
| 14.00-14.15| Break                        |
| 14.15-16.15| Excursion to a bio mass fuelled CHP plant |

Expected outcome
In summer 2012, the UP-RES project has provided support to extend similar training of urban planners with renewable energy and energy efficiency skills to other planning schools in Europe by means of publishing training materials. These downloadable materials comprise:
1. The module structure of training;
2. Introductory reading of the general approach and the content of each training module;
3. Sources in literature and internet for more detailed information; and,
4. Some 300 slides and supporting texts as well as shared experiences.

The material is available in 10 European languages such as:

- English
- Finnish
- French
- German
- Hungarian
- Italian
- Polish
- Romanian
- Spanish
- Swedish
- Hungarian
- Italian
- Polish
- Romanian

From fall 2012 on, the material is expected help extend such training to other European planning schools that consider integral spatial and RES planning as an important approach to fighting Climate Change.

The material above is freely downloadable. However, we would need to keep record on how, where and when such material has been applied in order to report on the use to the project sponsors, primarily the EU.
Urban Planners with Renewable Energy Skills – UP-RES

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Keywords: Urban planning, Energy planning, Renewable energy, Education

Summary

Traditionally, energy and emissions have not been integrated to the urban planning processes much so far. To fight Climate Change, however, such integration has become essential. The integration may materialize in the following two ways:

- The energy experts and the urban planners shall start working together with all development plans regardless existing or new building areas. In order to facilitate such co-working, training shall be provided to both types of professionals to understand each other.
- The training shall be extended to candidate and master level education in parallel to the continued education of professionals as well.

The paper at hand focuses on the pilot training of the urban planners and energy experts to understand each other when start working together in the European cities. The pilot training is carried out in five European countries, but it needs to be extended to all the other European countries later on.

The UP-RES (Urban Planners with Renewable Energy Skills) project provides support to such training by means of publishing training materials and sharing experiences in 10 European languages.

The paper at hand comprises six chapters as follows: (1) introduction to UP-RES, (2) the competence and training needs analysis to design the pilot training, (3) the pilot training approaches per country, (4) communicating the pilot training outcome to the other planning schools in Europe, (5) introduction to the project partners, and (6) the conclusions.

1. Competence and Training Needs Analysis

First, the Competence and Training Needs Analysis (CTNA) was carried out and consisted of:

- An on-line questionnaire survey on the competence and training needs of planners on sustainable energy production and supply which has been distributed to more than 2,700 persons, with a successful return number of 313, (25% more results than estimated contract 250), and analysis of the results; and,
- A series of interviews with heads of urban planning entities from each partner country (18 interviews in total), and 18 District Heating directors in Finland, and summary / analysis of the main issues.

The outcome of the CTNA was used to design the pilot training course specifically for each of five countries.

2. Pilot Training Approaches

The pilot training of RES focused urban planning in five countries is carried out in different variations to collect experience of the approaches for the future.

As an example, the eight training modules of the Finnish approach being typical to all but U.K is titled as follows:

- Module 1: Targets and policies of emission reduction nationally and globally. Watching the movie “Inconvenient Truth”.
- Module 3: Fuel and emission calculation of energy sources, Excursion to Kerava waste wood fuelled CHP plant.
- Module 4: Network systems (DHC with CHP) with energy efficiency and low emissions, introduction of RES in CHP. Familiarization with the internationally awarded district cooling (DC) system of Helsinki.
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- Module 7: Transportation and traffic related to EE &RES and emissions. Excursion to Helsinki capital region transportation centre.
- Module 8: Feed-back from the students and presentation of the student group studies in the presence of the National Steering Group members, Drafting plans for the future.

3. UP-RES Partners

The seven partners of UP-RES are as follows: (i) Aalto University, School of Science and Technology, Espoo, Finland as Coordinator; (ii) Sabaté associats Arquitectura i Sostenibilitat – SaAS, Barcelona, Spain; (iii) Building Research Establishment Ltd. – BRE, Watford, U.K.; (iv) University of Debrecen – UD, Hungary; (v) German Heat & Power Association – AGFW, Frankfurt, Germany; (vi) University of Augsburg – UA, Germany; and (vii) Munich University of Technology – TUM, Germany.

4. Communication of the Results

The activities of year 2012 - in addition to completing the pilot courses - focus on communicating, the experiences and materials to the other planning schools in Europe. As the links will be used professional journals and magazines as well as the organizations of IFME, AESOP (Association of European Schools of Planning) and Euroheat&Power (European association of DHC and CHP).
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1. Introduction

In very few planning schools in the world, the urban and regional planners are educated with understanding on energy, and on renewable energy sources (RES) and energy efficiency (EE) in particular. Such combined skills of energy and urban planning have become vital while fighting the Climate Change: the urban planner is the first actor in the spatial planning process, the plans which will either restrict or enable optimal RES and EE implementation in the district later on.

Therefore, training of urban planners with energy skills has started as pilot training in five countries such as in Germany, Hungary, Spain, U.K. and in Finland, the latter country to cover the coordination responsibility.

The traditional way of urban planning is that a municipality creates a general location plan. In such a plan, the buildings will be located to reflect the elevation of ground and to be connected to roads. The municipality also defines the physical dimensions of the buildings. The building code ensures that the new buildings meet the national EE norms. Thereafter, the energy and water utilities connect the buildings to their infrastructure in the best way still possible after the building location, type and size has been approved. In such away, however, it may be too late to optimize the RES and EE in the planned district!

In the new way, the energy experts and the urban planners start working together in the general plan stage already, it means before anything has been decided. The impacts of various plans will be quantified in terms of energy consumption, investment and operation costs as well as emissions. The impact quantification will cover the traffic, the heating and cooling of buildings and the overall electrification. The particular plan will be chosen for implementation, which offers the lowest life-cycle costs and emissions. In the city of Porvoo, Finland, for instance, a model case of the advanced and integral urban and energy planning has been demonstrated. As the main outcome, the urban plan alternative out of four together that was based on maximizing the share biomass fuelled combined heat and power production (CHP) and district heating (DH) appeared to be the best choice from environmental point of view. Moreover, the selected optimal case provided the overall life-cycle costs much lower than the traditional plan would have caused. In other words, the new combined energy and urban planning was a win-win approach from both the reduced emission and the lowest cost point of view. Such result was highly appreciated by the local municipal decision makers.

From the Fall 2012 on, the pilot training is planned to expand to other countries and universities in Europe as a measure to produce more sustainable communities. In order to facilitate such expansion, about ten other universities elsewhere in Europe have already expressed their interest in adopting combined education of energy and urban planning in their curricula. To support such adoption, UP-RES project will provide the key lessons and the training material, about 500 slides and the related explanatory text, translated into 10 European languages. The European universities and planning schools will be encouraged to use the material in their curricula free of charge.

In parallel to the urban planner training, the elements of EE and RES will be adopted in master and candidate courses as well.

The pilot training is a part of Intelligent Energy Europe (EACI) research program that promotes RES access on the energy market.

2. Competence and Training Needs Analysis

The Competence and Training Needs Analysis (CTNA) consisted of:

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The potential student profile comprises mostly architects (32.5%) and urban planners (31%, of which ¼ have an architecture degree as well), and engineers (11.3%). The educational level is high, and the general attitude towards inclusion of RES, DHC and CHP in urban planning was overall positive, although the general knowledge on these issues was not developed amongst the planners (except for solar energy in Spain and Germany), as for the time being the habit was of consulting experts on energy issues.
As UP-RES is a professional training for mostly practitioners, the outputs of CTNA recommend that the courses must be very practical, providing useful, competent and realizable skills, with real examples and interventions from specialists from urban planning and energy organizations. There is a strong demand for practical guidelines, implementable concepts, checklists, for unified documentation to aid planners in tackling the energy related issues rather than having various guidance documents. The Certification aspect is also asked for, but is seen more as an attendance certificate than a National standardized degree.

### 3. Pilot Training Approaches

#### 4.1 Five Variations in Training

According to the outcome of the CTNA, the planning conditions in the European countries vary a lot: use or not of consultants, allocation of work between the municipal officers and private developers, the overall concept of urban planners, urban planning process, etc. The differences in the urban planning are much larger than in the traditional engineering professions and processes. Therefore, the pilot training of RES focused urban planning in five countries is carried out in different variations to collect experience of the approaches for the future:

- **Spain**: 10 training modules as evening courses for some 30+ urban planners during Oct 2011 – June 2012;
- **Hungary**: An extensive training of 60 CETS for 30 urban planners during Sep 2011 – May 2012;
- **U.K.**: Pilot training comprising 20 charrettes of three days each to which the local players are invited. The players cover the local developers, investors, energy experts, political decision makers in addition to the urban planners;
- **Germany**: Pilot training to start in February 2012. In Germany, both urban planners and energy experts will participate the pilot training courses in order to create fruitful discussion and co-working capabilities amongst the two profession groups; and,
- **Finland**: 8 training modules of two days each for 26 urban planners as well as five group studies during Oct. 2011 – June 2012;
4.2 Example of Training Modules

As an example, the eight training modules of the Finnish approach being typical to all but U.K is titled as follows:

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6. Conclusions

As discussed, traditionally energy and emissions have not been integrated to the urban planning processes so far. To fight Climate Change, however, such integration has become inevitable. The UP-RES Project will provide experiences and training materials compiled from the five pilot courses implemented in various parts of Europe to those planning schools that understand the need of such energy and urban planning integration.

The real examples have shown that co-working between the urban and energy planning professionals can result in real win-win results. In Porvoo, Finland, for example, such co-working provided quantitative information of five planning alternatives that helped politicians to select the alternative for implementation that provided the lowest emissions and the lowest overall life-cycle costs as well. Moreover, the selected alternative is well suited to the desired living conditions while providing priority to the light and the public traffic, maximizing the use of RES and using low-energy buildings as well.
Energiatehokkuus osaksi asemakaavoitusta

Energiaa vahvistuu

Kaavoituksen avulla voidaan parantaa energiatehokkuutta ja vähentää ilmastopahastojia, kun energia-asiat otetaan alusta pitkien huomioon.

Energiatehokkuus ja ilmastonvaihteen

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Energialuonnolliset laitteet

Energialuonnolliset laitteet on mainittu energialuonnollisten laitteiden valmistajien ja laitekaupan edustajien kanssa solmittuessa sopimuksessa vuodelta 2010 lähtien. Sopimus on vahvistettu kesällä 2013, kun energialuonnolliset laitteet olivat käytössä pian sopimuksen valmistuttua. Sopimuksen vahvistaminen on keskinäistä, ja sen tarkoituksena on vahvistaa energialuonnollisten laitteiden käyttöä ja sen vaikutukset ympäristölle ja tulevien sukupolven pahoitteluista.

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