Roundtable 6

UP-RES: DHC and Urban Planning

Arto Nuorkivi

Aalto University

REDUCE, RECYCLE, REPLACE: DOUBLING DHC NOW!

35th Euroheat & Power Congress, Paris May 9th and 10th 2011

WHY SHOULD URBAN PLANNING INVOLVE DISTRICT HEATING & COOLING (DHC)?

UP-RES

Urban Planners with Renewable Energy Skills

Challenges to Urban Planning

- Need to reduce heat consumption in buildings;
- Need to reduce fuel consumption in transportation;
- Need to reduce electricity consumption in lighting, cooling, heating;
- Need to turn from fossil to renewable energy;
- Need to reduce overall emissions to atmosphere; and,
- Need to circulate material flows of waste and energy supplies (use of ash, waste to energy,..).

Barriers to Overcome

- At present, urban areas tend to be scattered rather than centralised, which means higher energy consumption and emissions!
- Therefore:
  - Urban planners should know the importance of spatial plans to energy and emissions;
  - Urban planners should understand the consequences of their spatial plans to energy and emissions;
  - Planning guidelines should include energy as the major planning parameter;
  - Renewable energy requires a new way of thinking in urban and spatial planning that does not exist yet.

Urban Planners not aware of DHC

- Energy and emission issues are not taught to urban planners, neither in planning schools nor in continued education programmes in general;

- Only three universities were identified in Northern America and the EU that have integrated energy and emissions with their urban planning syllabus

Why urban planning benefits from DHC and RES (Renewable Energy Systems)?

- CHP (combined heat and power) is the most efficient way to use any renewable fuel to generate heat, power and cooling;
- Centralised heating and cooling load is vital to CHP and RES: there is no CHP without heat load;
- The heating and cooling load depends on urban structure: heat density and load level; and,
- DHC enables a variety of different fuels and waste energies to be used for urban energy supply in a sustainable way.

Energy Efficiency Starts from Urban Planning

Structure of community influences emissions both directly and indirectly

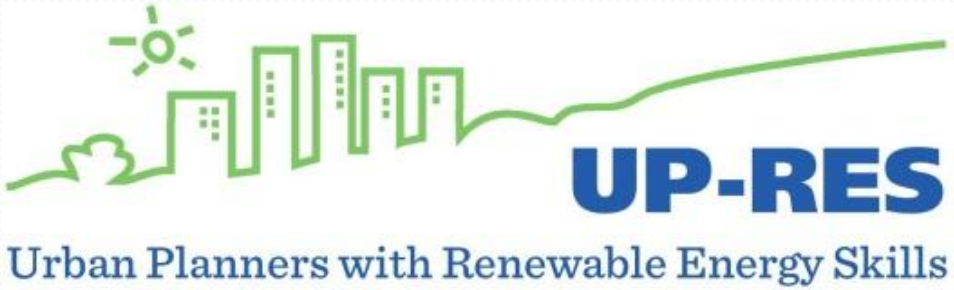
Directly: Dense community with less distribution infrastructure and road length

Indirectly: energy supply changes which may have about 30% impact on emissions

Without emission analysis the communal decision makers are not aware of the impact of their planning decisions on energy and emissions. Such decisions have long-term impact, up to 100 years ahead

- Energy supply and GHG emission analysis has to be incorporated with spatial planning and be carried out together with the Environmental Impact Analysis
- Often this should lead to more effective use of land and reduction of emissions

HOW DOES *UP-RES* PROJECT HELP?



Objectives of UP-RES

Identify and review barriers and best practices for sustainable development of DHC in order to:

Facilitate an expansion of DHC systems in order to increase the global energy efficiency,

- Mitigate climate change through reduced carbon dioxide emissions, and
- Increase national security of supply.

Focus of UP-RES

- Renewable Energy Directive: to promote RES in heating, cooling and powering of communities at high energy efficiency.

- EU coverage: Experience from 5 training pilots to be extended to European level through European level associations and meetings.

Contents of UP-RES

- Review planning guidelines in a number of cities in EU;
- Review education programmes of urban planners in universities in EU;
- Record and present positive examples of urban planning as models of good approach;
- Design and implement pilot training courses of RES to urban planners in Germany, Finland, Hungary, Spain and UK;
- Draft recommendations for urban planning that take RES and its emission relations into account; and,
- Prepare a plan for EU-certification of energy skilled urban planners.

Deliverables of UP-RES

- 5 countries in different parts of Europe to deliver pilot training programmes and courses to urban and regional planners;
- 200 planning schools and institutes in EU as members of AESOP informed and activated;
- 1000 heating and cooling utilities in 32 countries will be informed and activated through Euroheat&Power and AGFW;
- 20 European research institutes and universities informed;
- 20 European associations of urban planners and architects informed;
- 400 regional and urban planning organisations in Europe informed; and,
- Training material summary issued in 10 EU languages.

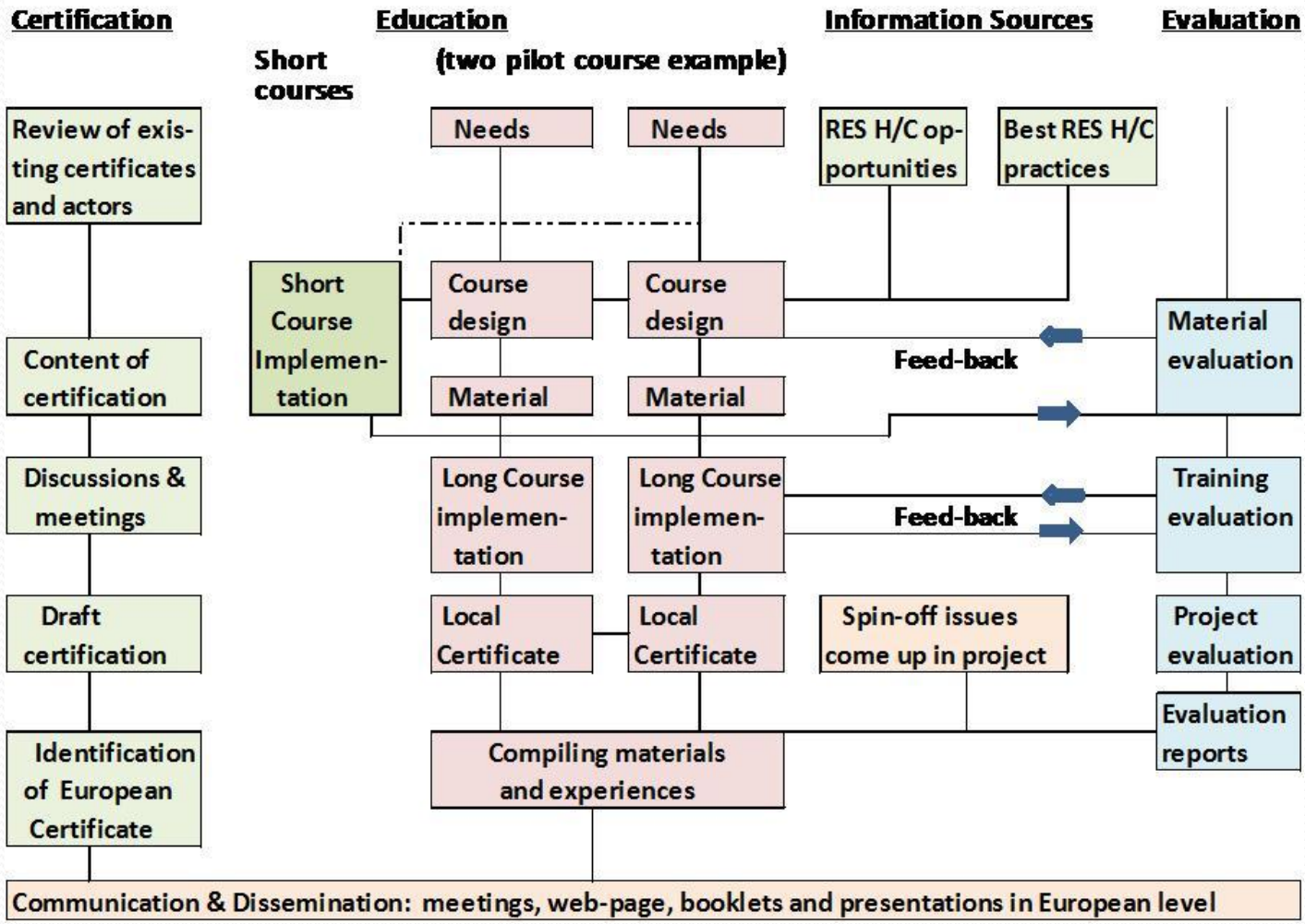
Co-operators of UP-RES

- **Association of European Schools of Planners (AESOP)**
- **Euroheat & Power and DHC+ Research Platform**
- **Urban planner organisations**
- **National Steering Groups**

Seven partners of UP-RES

- **Finland: (1) Aalto University with various departments and its Aalto Pro as leader;**
- **Germany: (2) District Heating Association - AGFW, Frankfurt, (3) University of Augsburg - UA and (4) Munich University of Technology, Munich –TUM;**
- **UK: (5) Building Research Establishment Ltd. - BRE, Watford;**
- **Spain: (6) Association of Architecture and Sustainability in Catalonia, Barcelona – SaAS;**
- **Hungary: (7) University of Debrecen.**

Flow chart of UP-RES

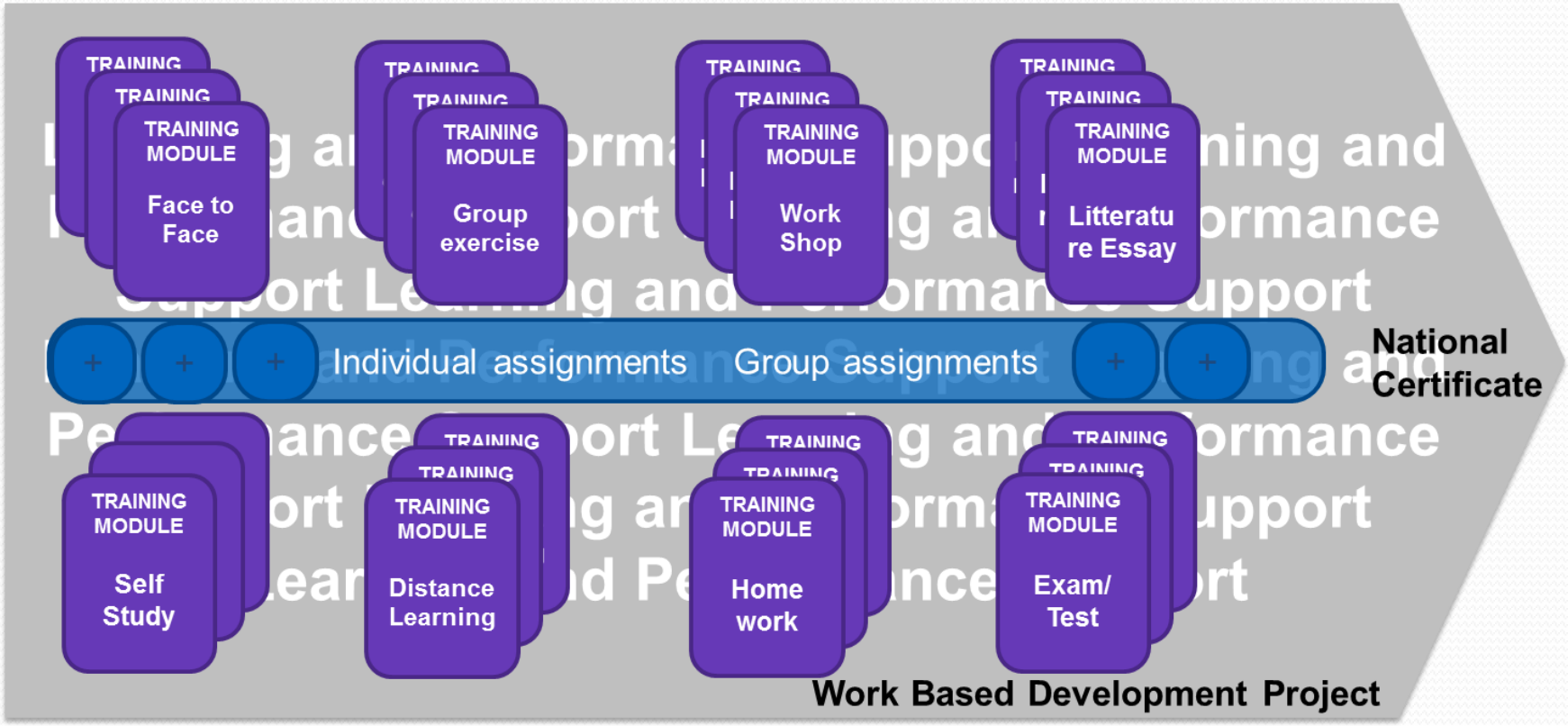


HOW IS THE PILOT TRAINING STRUCTURED?

UP-RES

Urban Planners with Renewable Energy Skills

Elements of training



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A. Short courses

Structure of the training course

- 20 charettes
- 3 day duration of each charette during 2011
- 20 charettes will be implemented in various parts of UK
- Each charette collects the local urban planners, energy experts, architects, developers to work together
- Each charette shall produce an idea/initial plan about how to integrate RES, DHC or CHP in their communnity

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B. Long course

Structure of long training course

- 9 months duration: Sep 2011 – May 2012
- Will be piloted in Spain, Hungary, Germany and Finland
- Home work will be designed for each student in such a way that it integrates energy issues to his/her normal work;
- An excursion abroad (voluntary) of 3-5 days will take place in Spring 2012;
- 8-12 training modules (seminars of two days each) will be organised in the university including local excursions.

Eight training modules (M1..M8), the excursion abroad and homework are described in the following slides.

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Modules of long training

- M1 Reasons and targets of emission reduction (9-2011)
- M2 Buildings: old and new ones (10-2011)
- M3 Calculation of emissions of fuels (11-201)
- M4 Cities: energy and emissions (12-2011)
- M5 Country side: decentralized energy systems(1-2012)
- M6 Economy and energy (2-2012)
- M7 Traffic: Energy efficiency and emissions (3-2012)
- M8 Student seminar (5-2012)

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M1 Targets for emission reduction

- Role of various energy forms in Climate Change
- Movie: Inconvenient thruth
- Latest examples of implications of Climate Change
- Policies, targets and measures of energy efficiency and emission reduction in:
  - My own country
  - In the EU
  - In other countries: USA, China, Russia

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M2 Buildings: Old and new ones

- Requirements of existing building codes
- Building materials: life-cycle impacts of wood, steel and concrete
- Energy auditing
- Passive and low energy houses: theory and practice
- Lighting today and development views from energy consumption point of view
- Home devices: energy labelling and impacts
- Energy efficiency to be included in building rehabilitation projects
- Exercise: Life-cycle analysis of building materials

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M3: Fuels and emissions

Fuels

- Heating values of fuels
- Primary energy factors
- Logistics

Heat production

- Boiler plants
- Combustion

Emissions

- Emission factors and emission calculations
- Flue gas cleaning

Exercise: Emission calculations

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M4 Cities: energy and emissions

- CHP: methodologies, benefits, restrictions
- District heating: systems in practice
- District cooling: new opportunity
- Waste water heat pumps
- Communal waste: collection, recycling, incineration
- Co-operation with local industry
- Presentation of a model for emission calculation
- Exercise 1: Emission calculations in CHP
- Exercise 2: Applications of RES in the cityCase: tbd
- Excursion: tbd

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M5 Country side: decentralised energy systems

- Heat pumps: gound water and air heat pumps
- Using ground water for cooling
- Wind power
- Production of liquid bio fuel
- Solar heat collectors
- Photovoltaic panels
- Excercise: Applications of RES in country side

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M6 Economy and energy

- Financial and economic analyses of energy options
- Life-cycle cost analyses: methodology and results
- Local economies
- Exercise: Life-cycle analysis of a case

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M7 Transportation: Energy economy and emissions

- Energy efficiency and emissions of various engines
- Development of fuels in transport sector
- Comparison of various transport vehicles relative to transport capacity
- Exercise: emission calculation of transportation
- Excursion: tbd

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M8 Completion seminar

- Meeting the needs of other training that have popped up during the course
- Repetition of selected issues
- Collection of feedback

- Excursion: tbd

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Homework

- Will be initiated in the in first two months of the course
- Topics will be designed to be close to the normal work of the individual in his/her planning organisation, but to include DHC, RES or CHP
- Presentation of individual homework outcomes and providing feedback during the last two months of the course

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Excursion abroad

- Voluntary, the price will be set later in April 2011
- Timing: 3-5 days in April 2012
- Green cities to be visited: tbd

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Initial Results so far

Competence and Training Needs Analysis has been carried out in all five countries for urban planners and in Finland for DH directors as well;

9 short courses implemented;

9 other planning schools are committed to co-operate and adopt modules of UP-RES in their curricula from 2012 on;

12 training modules have been pre-designed for the pilot training, a two-days program per module;

70 individuals have committed to participate the pilot training in four countries starting in September 2011

Additional Information

Contacts:

Arto Nuorkivi, Email: energy.at.nuorkivi.fi
Anna-Maija Ahonen, Email: anna-maija.ahonen.at.aalto.fi

Aalto University
Professional
Development

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