

Lahti, Finland

Turing the heat down in Finland

We all want to become smarter in ecological housing. K-Easy is a project about becoming totally ecologically smart in housing: how to plan, build, renovate and recycle ecologically. K-Easy brings together innovation and good practices of low carbon city planning, energy efficient housing and smart technologies, comprehensive planning of building renovation, making use of building waste and upgrading waste management and recycling.

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K-Easy is about becoming totally ecologically smart in housing: This total smartness means bringing together development and innovation – which are often too far apart – to create total eco-smartness ‘from the cradle of housing to the grave – and back’. This involves five aspects: low-carbon city planning, energy-efficient housing and smart technologies, comprehensive planning of building renovation, making use of building waste and upgrading waste management and recycling. It is an attempt to take a comprehensive and synergic look at sustainable housing, and to make innovations at the interfaces between established areas of expertise. K-Easy is interesting in terms of bringing together innovation, high-class professionalism and good practices covering five different topics in five sub-projects. Overall the project aims to reduce carbon footprints by improving the energy- and eco-efficiency of the building stock and urban design.

K-Easy is also interesting in the way that it brings together research and very practical elements and actors, and at the same time also reaches end-users and even citizens, as in the case of models for renovation planning. The project has already put in place quite good dissemination channels to spread the results as they emerge via universities, regional actors, SMEs, real estate foundations and managers, technological clusters and Centres of Expertise.

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Sustainable development, energy efficiency and reducing the carbon footprint are high on Europe’s agenda. One key area that need to be addressed to reach new levels is housing, and related to that a whole range of interconnected issues and activities such as city planning, sustainable building and renovation, ecologically smart technologies in homes, efficient waste management and the reuse of waste as products and energy. Lots of activities, technologies and models are addressing these issues, but the attempts are often fragmented, do not consider the entire life-cycle of buildings, and are not using the potential of new interfaces between different smart housing technologies and actors.

K-Easy, a project financed by the European Regional Development Fund in the south of Finland, has a story to tell about how to become totally ecologically smart in housing: how to plan, build, renovate and recycle ecologically. K-Easy brings together innovation and good practices linked to five different topics that were addressed in five sub-projects. These are low-carbon city planning, energy-efficient housing and smart technologies, comprehensive planning of building renovation, making use of building waste and upgrading waste management and recycling. It is an attempt to take a comprehensive and synergic look at sustainable housing, and to make innovations at the

interfaces between these policy areas. The thread running through the whole project is energy-efficient housing and construction, waste management and recycling. Overall the project aims to reduce carbon footprints by improving the energy- and eco-efficiency of the building stock and urban design.



Becoming eco-smart is vital for Finland

Energy and eco-efficiency are vital for Finland – for obvious reasons. One-third of Finland lies north of the Arctic Circle, and Finland is on the same latitude as Alaska. Although the Gulf Stream tempers matters somewhat, the winter climate in Finland is cold and harsh. Ground frost can penetrate two metres deep. Temperatures can go down to -50C in the eastern and northern parts of the country, and in Lapland the record frost was measured in 1999: -51.5 C in 1999. This means that good and sustainable building, renovation and efficiency in heating and energy use is vital, both nationally and for individual families and companies.

The oil-crisis 30 years ago served as a shock and a serious wake-up call regarding energy and sustainable development for Finland, which was then highly dependent on imported energy, and since then many initiatives have been taken, both on a national and regional level, to promote energy efficiency and citizen awareness. Since the late 1980s, Finland has striven to enhance the role of sustainable development in all mainstream policies.

Top-down: Creating a favourable policy environment for eco-smartness

Finland is a small country, which cannot afford to waste energy. To foster sustainable development calls for fostering cooperation. The Finnish National Commission on Sustainable Development (FNCSD) was established as early as 1993 – in the aftermath of the Rio Conference on Environment and Development – and it was one of the first such commissions in the world. In Finland, sustainable development is considered as a learning process for the entire society, which increases ownership and commitment to building up a good life in a sustainable society. This approach is referred to as the 'Finnish model', in which broad-based, multi-stakeholder participation is combined with high-level political leadership. In this model, the government, civil society and business life are engaged in an open dialogue on sustainable development policy.

The government set a new period for the current FNCSD in February 2008. The Prime Minister chairs the Commission, and it has 44 members including six other ministers, the parliament, public administration, business and industry, municipalities and regions, trade unions, the educational sector, NGOs, science and research, arts and churches. The fact that the Prime Minister leads the commission characterises Finland's commitment to sustainable development.

To speed up innovation and cooperation on these matters, a long-term climate and energy strategy was approved in 2008 by the parliament and the national government. This strategy, which is based on the climate and energy package of the European Council and the Commission, outlines the measures Finland will take to reduce greenhouse emissions and improve energy efficiency and renewable energy. This forms the basis for all policy planning related to energy use and production.

A lot to win in eco-smartness in housing

Buildings and construction account for about 40 per cent of all energy use and emissions in Finland, and the proportion is even higher if transport emissions are included¹. This means that there is lot to gain in this field. The situation is exacerbated by the fact that a lot of housing, especially in apartments built in the 1970s and 1980s, are often in bad shape, and in need of renovation. And renovation is a chance to upgrade eco-smartly.

Planning cities and buildings, renovating and taking care of waste is a complicated business, because it is a field in which know-how and innovation are moving forward rapidly in the world. It is a huge challenge to tap into the fast-changing innovations in these areas, and an even bigger challenge to disseminate good practices and techniques to foster smart solutions.



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Action plan to become energy-smart in housing

Based on the strategic framework for sustainable development, on a more practical level, the Finnish housing minister gathered together a broad-based group of experts in January 2010, to map out the best ways to take new steps in energy-smartness. The *ERA17* action plan for an Energy-Smart Built Environment 2017, adopted by the National Government,

is the fruit of this collaboration. An energy-smart built environment refers to an energy-efficient, low-emission, high-quality built environment that employs all necessary means to mitigate climate change. There are many factors that contribute to energy-smartness: planning land use to avoid urban sprawl and secure fluent public transport and closeness of services,, low emission construction and renovation, where more efficient and sustainable energy solutions, like solar and wind energy, are out in place. Ownership and use of real estate needs to become more knowledgeable of energy efficiency, and information systems need to be more compatible. The *ERA17* action plan encourages Finland to regain its position as the leader in energy-efficient built environments. The oil-crisis in the 1970ies prompted Finland, which was very dependent on imported oil in heavy industry and heating, to become more energy efficient, and for some time was the top of the class, only to find that other countries have caught up, and even surpassed. The plan's ambitious goal is to reach the green house emission reduction targets, set by the EU for 2020 three years early, already in 2017, in Finland's centennial year. The ultimate goal of the plan

¹ Transportation of building materials represents a significant additional CO2 factor

is that in 2050, 'Finland will be able to offer the world's best living and operating environment for people and businesses'.

National Expertise Clusters

But how to deliver these ambitious goals? An important practical vehicle to realise these ambitious goals is the Centre of Expertise programme. This programme is a fixed-term (2007 – 2013) national programme coordinated by the Ministry of Employment and the Economy (which is also the Managing Authority of the European



Regional Development Fund), in compliance with the Act on Regional Development. The Programme targets local, regional and national resources at the use of top-level expertise in energy, environment and construction matters. It supports regional networking, cooperation and know-how in becoming ecologically smart, promotes specialisation of regions in different aspects of ecological efficiency and cooperation between Centres of Expertise, and aims at transforming expertise into new business and jobs. The Programme lays the ground for diverse innovation activities in which high-level research is combined with technological, design and business competence. It is a tool for regional innovation, which contains ready-made operating models and networks for the national and international markets. The programme offers networks and services for companies, universities, universities of applied sciences and research institutions.

The Centre of Expertise Programme is realised through thirteen **National Expertise Clusters**, each of which contains between four and seven Regional Centres of Expertise. The approach developed in K-EASY is a product of one of these in one city, but the Finnish system is comprehensive and produces similar results elsewhere.

Becoming smart with the environment and housing

This brings us to the **Cleantech Expertise Cluster**² (the environmental cluster) and the **Housing Expertise Cluster**, which are two of the clusters most closely related to K-Easy. Lahti Science Park is the hub of the Cleantech Expertise Cluster, and at the same time the coordinator of K-Easy. Cleantech Expertise Cluster is an Environment Technology Cluster promoting energy efficiency in companies, so that competitive products are manufactured using smaller amounts of material and with less impact on the environment. Material efficiency promotes competitiveness by improving productivity and reducing production costs. Housing Expertise Cluster promotes energy and material efficiency in building and housing.

Bottom up: Initiative to launch K-Easy comes from Lahti

The city of Lahti, a vibrant and enterprising city of 100 000 inhabitants in Southern Finland, is the home (and owner) of Lahti Science and Business Park, the hub and coordinator of K-Easy. The national strategies described above form the top-down framework for K-Easy. The project's begin-

² http://www.cleantechcluster.fi/en/main_page/?id=7

ning was a successful energy-saving project that the Science Park recently carried out in the Lahti region. It collaborated with an industrial company in a development project to change from oil to geo-thermal heating (use of heat of the sun restored in the ground or water with compression pumps) and energy-efficient use of exhaust-air, and as a result heating costs were considerably reduced – in fact the investment paid for itself in only 4.5 years. Lahti Science Park thought this kind of model should be disseminated via pilot projects to widen its use.

Another precursor of K-Easy was the need for energy efficiency in renovation of apartment buildings in the city of Lahti. The Science Park worked with the National Association of Housing Companies, the city of Lahti and private housing and industrial companies in the Lahti area to develop energy efficiency. The aim has been to equip housing companies and industries with practical plans, models and tools for eco-smart energy use, building and renovation. These plans would make it possible to evaluate long-term alternatives for making the buildings more energy-efficient, and to plan the actual process of renovation more efficiently. All this would help both the owners and tenants to understand the whole process more clearly, make decisions and commit to the solutions.

To prepare the project, Lahti acted as the coordinator of partners from participants in the Centre of Expertise Programme, inquiring if they would be interested in joining a project around the theme of sustainable housing. The Technical University of Lappeenranta was also approached to join. All the partners had undertaken earlier development initiatives, which were now brought under the aegis of K-easy, thus connecting otherwise disparate innovations, and fostering a virtual circle of innovation.

Five projects become K-Easy

K-Easy has tackled some important aspects of total eco-smartness in housing. The first issue is how to find ecologically smart solutions when renovating buildings. The 'Energy Performance of Residential and Industrial Buildings' project has produced practical guides for promoting energy efficiency in residential and industrial buildings. The project, which is run by the K-Easy coordinator, investigates the energy consumption and energy saving potential of residential buildings and industrial halls. It has developed and successfully piloted renovation-planning models for residential buildings. In industrial buildings, the focus is on electrical and thermal energy-saving models and enhancing user know-how. The real estate managers have been really pleased with the results. 'It makes good sense to carefully plan the whole renovation process to become eco-efficient,' said a real estate manager. 'It means slowing down the process in the beginning to really look into things, but it pays off well as the end result.' The models developed will be disseminated to the entire country via housing companies.

A second issue is whether smart technology can help eco-effectiveness in housing. The 'Predictive Building Technologies' sub-project of Lappeenranta University focuses on investigating alternative energy generation systems for residential environments. Via demonstration environments, it builds pilot systems capable of storing solar and wind generated electricity and automatically drawing on these local reserves during grid electricity price peaks. The results will feed into technologically smart eco-housing.

What about eco-smart planning in cities? The 'Tools for Low Carbon Construction' project, run by another Centre of Expertise in Southern Finland, supports urban development by creating planning tools for low carbon city planning. With these tools cities can improve the city structure and promote citizens' habits to become more ecologically sustainable. The aim of the project is to develop a method to assess the carbon footprint of both the construction phase and the use of the build

area, in order to have a complete picture of the carbon footprint of the solutions. The assessment tools are designed to assist local and municipal authorities in steering regional development towards low-carbon society objectives and have been produced in close collaboration and piloting with the city planners.

Finnish cities produce a lot of demolition waste, but could it be reused? The 'New Products from Construction Waste and Recycled Building Materials' sub-project promotes the use of construction waste and recycled construction materials as raw material for new product applications, and to assess the use potential of these materials, which could be used for instance as building materials, in furniture, fibre-composites and packaging, and has piloted and tested these with companies.

Finally, local authorities, which are a very important actor in the Finnish governance and service landscape, also need to become eco-smart. The 'Material Efficiency and Waste Management' sub-project has created action models for preventing housing-waste generation, and has identified opportunities for waste recovery and for the production of raw materials and energy. These range from prevention of producing waste to sorting and recycling waste, saving energy, increasing use of renewable energy to increasing collaboration of actors related to waste management and generally increasing awareness both among authorities and the public on waste management.

It has also promoted cooperation between local authorities and SME enterprises within the sector. A new type of heating system for detached housing has been developed, and energy planning services have been 'packaged' into service products.

Total smartness

K-easy is a project where a rich and determined set of top-down strategies on sustainable development meet bottom-up local and regional initiatives, and contribute towards totally smart eco-housing.

This total smartness means bringing together two functions which are often too far apart – development and innovation – to create total eco-smartness 'from the cradle of housing to the grave – and back again'. K-Easy is interesting in terms of bringing together innovation, high-class professionalism and good practices covering five different topics in five sub-projects: low-carbon city planning, energy efficient housing and smart technologies, comprehensive planning of building renovation, making use of building waste and upgrading waste management and recycling. It is an attempt to take a comprehensive and synergic look at sustainable housing, and to make innovations at the interfaces between them.

It is also interesting in the respect that it brings together research and very practical elements and actors, and at the same time also reaches end-users and even citizens, as in the case of models for renovation planning. Also the project has already put in place quite good dissemination channels to spread the results as they emerge: universities, regional actors, SMEs, real estate foundations and managers, technological clusters and centres of expertise.

AEIDL has been contracted by the European Commission in 2012 in order to provide 50 examples of good practice in urban development supported by the European Regional Development Fund during the 2007-2013 programming period (contract reference 2011.CE.16.0.AT.035). The views expressed by AEIDL remain informal and should not under any circumstance be regarded as the official position of the European Commission.