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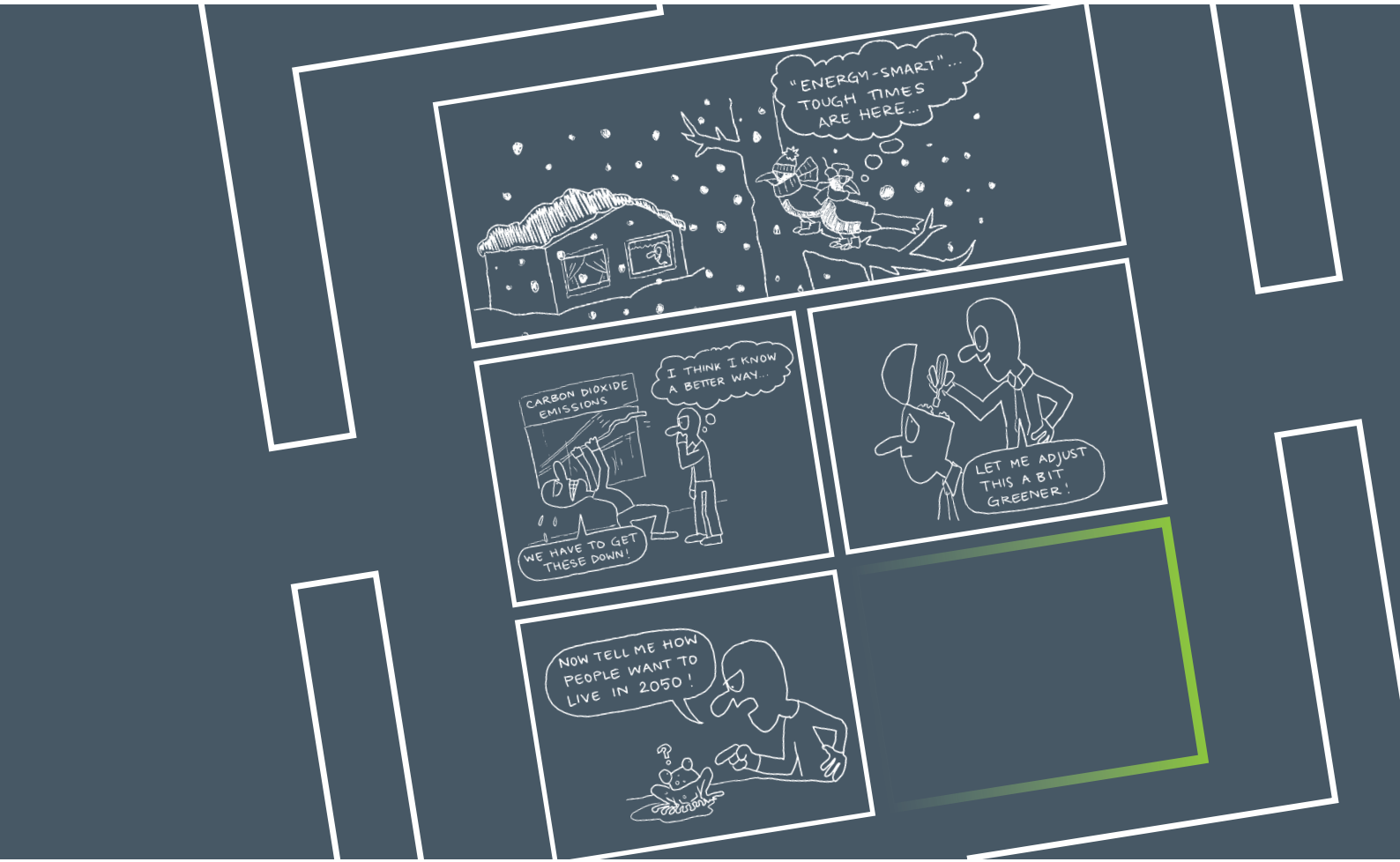
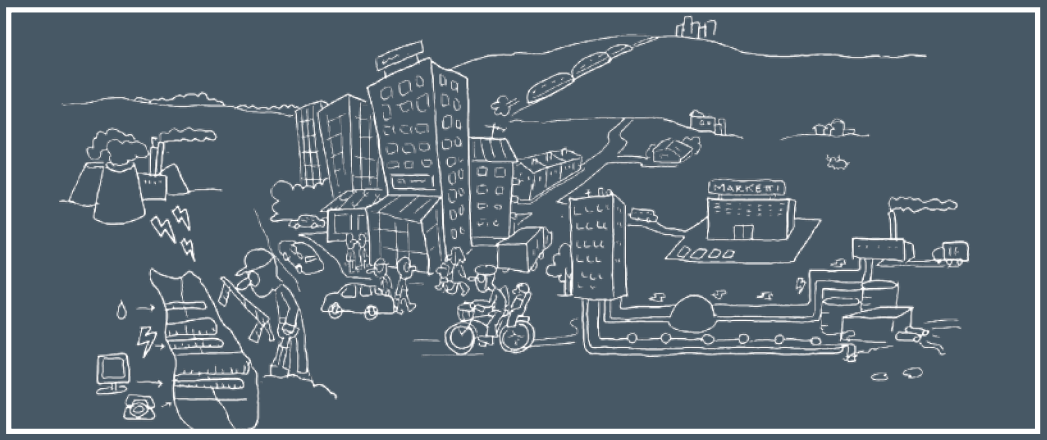
ERA 17

For an energy-smart built environment 2017





Annika Varjonen and Leena Ahveninen

THE VISION OF ERA17:

- FINLAND WILL BE A PIONEER IN ENERGY EFFICIENCY IN 2017, FINLAND'S CENTENNIAL YEAR
- CHOICES MADE BY CONSUMERS AND BUSINESSES WILL CREATE MARKET-LED EFFICIENCIES IN ENERGY USE
- ENERGY EFFICIENCY WILL CREATE NEW SKILLS AND BUSINESSES
- SOLUTIONS EMPLOYED IN RENOVATION PROJECTS WILL HALVE THE NEED FOR HEATING ENERGY
- INCREASED USE OF PUBLIC TRANSPORT, CYCLING, AND WALKING WILL CUT TRANSPORT EMISSIONS
- LEGISLATION AND CONSTRUCTION-STEERING WILL SET THE FRAMEWORK FOR CHANGE
- CITIZENS, BUSINESSES, AND MUNICIPALITIES ALL WORK TOGETHER FOR CHANGE

ENERGY-SMART FINLAND TO LEAD THE WAY

In 2017, Finland will celebrate the 100th anniversary of its independence. What will Finland be like then, or in 2050, when the schoolchildren of today turn 50?

Climate change is the greatest challenge of our time. The energy efficiency of our built environment is of crucial importance as we try to mitigate climate change. Buildings and construction account for about 40 per cent of all energy use and emissions, and the proportion is even higher if we include transport emissions.

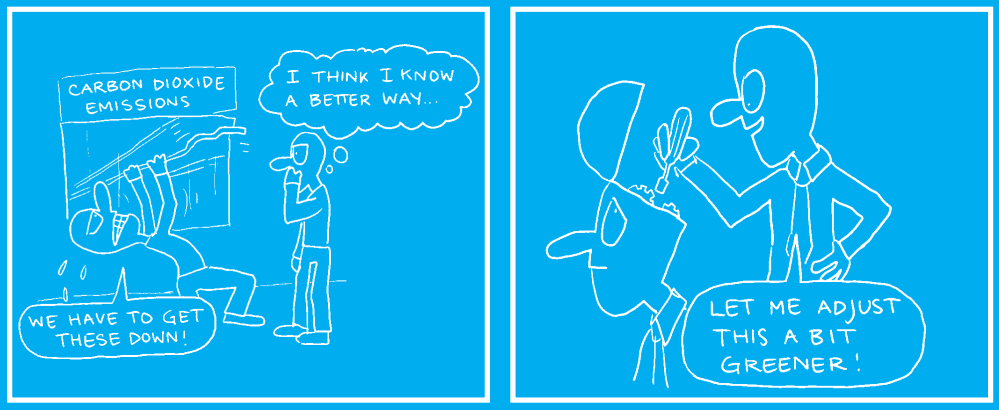
After the energy crisis 30 years ago, Finland was a pioneering country in energy efficiency. The action plan ERA17 for an Energy-Smart Built Environment 2017 encourages Finland to regain its position as the leader in energy-efficient built environments. The plan's ambitious goal is to reach the efficiency requirements set for 2020 three years early, in 2017, in Finland's centennial year.

Several factors contribute to an energy-smart built environment, such as land use, construction of new buildings and renovation projects, building maintenance, and the use of renewable energy. In January 2010, Finnish Minister of Housing Jan Vapaavuori gathered a broad-based group of experts to map out the best ways to take us further in energy-smartness. The ERA17 for an Energy-Smart Built Environment 2017 action plan is the fruit of this collaboration. The following pages present the main proposals of the ERA17 programme for improving the energy efficiency of built environments.

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

ENERGY-SMARTNESS

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.



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AN ENERGY-SMART WORLD: WHOSE ACTIONS COUNT?

In essence, being energy-smart shows in those everyday choices that all consumers make. Steering by public authorities must support the sustainability of these choices. This creates new opportunities for businesses to develop in Finland and internationally.

The most significant energy-efficiency choices individuals make in their everyday lives are how they heat their homes, the electrical appliances they use in the home, and the location of their homes in relation to their workplace and services they use. Those choices will determine whether our lifestyle carbon footprint is one tonne of carbon dioxide per year or 20.

The more we know about the environmental impact of our lifestyles, the more energy-smart our living and consumer habits become. For instance, when buildings are rated according to their emissions, it will become possible to compare their energy efficiency, and, as a result, we will learn to demand better quality in this area of life. Real-time metering will provide us with information on how our consumption habits relate to our living costs, which, in turn, will help reduce energy and water consumption.

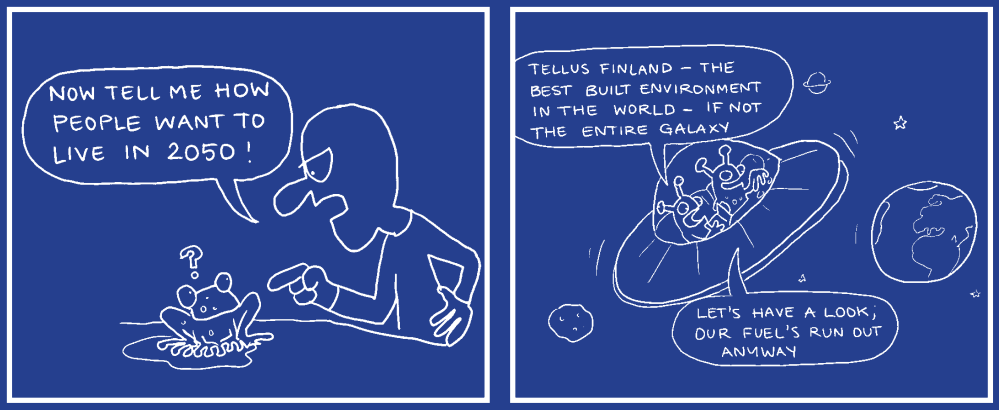
Consumer choices determine what kinds of services and products businesses will develop and offer to the market. These will create new jobs for the new era's professionals, who are experts in sustainable buildings and building maintenance processes.

Building design and maintenance must move from being separate services to being comprehensive services that focus on energy efficiency. Businesses will increasingly become service companies, and the guiding principles for tendering and awarding contracts will be based on the efficiencies in energy use that they can offer.

Distributed methods of energy production and zero-energy construction may change the energy markets and create new business opportunities. Cutting emissions may become more attractive to owners and developers if buildings were included in emission-trading schemes.

Municipalities are also expected to take a leading role in promoting energy-smartness. Local energy-efficiency strategies must specify objectives for planning, land acquisitions, and energy production, as well as set energy-efficiency targets for municipally-owned buildings and buildings within local jurisdiction.

The building of additional dwelling units must be assessed for its energy efficiency, and the integration of the urban structure must be promoted through provision of public services primarily inside established service zones. Local building permits are a good tool for practising advance quality control, providing advice on energy-smart solutions, and putting them into practice in planning both new building and renovation projects.



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RECOMMENDED ACTIONS:

- TOTAL ENERGY ASSESSMENT TO BE PART OF IMPACT ASSESSMENT IN URBAN PLANNING
- BUILDING OF ADDITIONAL DWELLING UNITS TO BRING EFFICIENCIES IN ENERGY USE
- DIFFERENT COMMUNITIES AS SOURCES OF CARBON EMISSIONS
- LIMITS TO URBAN SPRAWL
- COLLABORATION BETWEEN LAND USE AND URBAN PLANNING AND SUSTAINABLE TRANSPORT PLANNING
- COOPERATION DURING DEVELOPMENT OF AREAS, SUPPORTED BY COMPATIBLE IT SYSTEMS
- MAYORS ARE PIONEERS IN DEVELOPMENT PLANNING

ENERGY-EFFICIENT LAND USE

Combining good quality of life and energy efficiency is the key task for lively future communities. A dense urban structure, smooth public transport, and nearby local services are also factors many of us regard as essential for high quality of life.

A dense urban structure is the way to ecological everyday living

Municipalities hold many important keys to energy-efficient land use. Through planning and other choices municipalities are able to steer land use and the built environment toward energy-smartness. Some Finnish cities, like some cities in other countries, have already taken the lead by including the calculated effects of carbon emissions of energy supply solutions, transport services, and buildings in their planning of new housing areas. In future, this will be the norm, not an exception.

Within urbanised areas, it makes the most 'energy sense' to build densely, so that local services will have enough customers, and people feel that they are part of a community. The importance of an integrated urban structure is greatest in growing urban areas. Particularly in these areas, it is essentially important to strengthen public transport systems: it is difficult to cut carbon emissions if families cannot cope without two cars.

The building of additional dwelling units in private housing areas may be promoted by encouraging more efficient use of available sites and making planning and building permit processes more efficient. Integrating the urban structure will also ensure that the conditions are met for district heating systems, as the energy use of buildings will gradually decrease.

LIMITS TO URBAN SPRAWL

To integrate the urban structure, a carrot-and-stick approach may need to be used – in this case, it could be the service zone model as defined in the internationally recognised Urban Growth Boundary (UGB) model.

The model establishes a regional boundary on a map to steer urban growth, and it provides assurances of services within these boundaries. The simple goal of the model is to steer new building into the vicinity of existing services. Canada, the USA, and Australia have successfully used the model to limit urban sprawl.

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RECOMMENDED ACTIONS:

- READINESS FOR UTILISING SOLAR ENERGY, TO ENABLE ZERO-ENERGY CONSTRUCTION
- REAL-TIME ELECTRICITY PRICING

DISTRIBUTED METHODS OF ENERGY PRODUCTION

Emissions from energy production may be reduced by producing energy in buildings or locally. With local production of solar or wind-generated electricity, the amount of 'paid electricity' decreases. It is easiest to integrate self-production of energy into buildings during their construction, but good design and planning allows this to be done in renovation projects as well.

Will micro-production save the climate?

For buildings to reach a near-zero-energy level, local energy production based on renewable energy sources is required. In real life, this usually means the local production of solar energy.

Finland can take the lead in this development. We are well positioned for distributed methods of energy production, because it is possible with our power grids to feed self-generated electricity from buildings into the grid. But if we sit on our hands, zero-energy solutions will be brought into Finland from abroad and we will lose this business opportunity.

Publicly funded support during the transition is required to help promote swift adoption of micro-plants. It has been proposed that micro-plants be completely exempt from tax on electricity. In the long run, however, these support methods will not be needed, because the price of fossil fuels will increase and, at the same time, solar energy solutions will develop to become more cost-efficient.

SOLAR ENERGY IS HOT

The long and dark Finnish winter is often used as an excuse for thinking that there is no point in utilising solar energy in Finland. However, the rapid development of solar energy solutions guarantees that solar energy will in the near future be compatible with traditional forms of energy.

Solar energy is well suited to both low-population-density areas and urban environments. It makes good use of the unused surface space of buildings.

In addition to solar energy being a totally emission-free form of energy, it is also a very reliable one – what other form of energy do we know that will be available for billions of years more?

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RECOMMENDED ACTIONS:

- A BUILDING REGULATION ROADMAP TO ENABLE ANTICIPATING THE TIGHTENING OF ENERGY-EFFICIENCY STATUTES AND REGULATIONS
- RENOVATION WORK TO BE REGULATED UNDER BUILDING REGULATIONS
- A SYSTEM TO BE CREATED FOR VERIFYING THE QUALIFICATIONS OF SERVICE PROVIDERS INVOLVED IN CONSTRUCTION AND BUILDING MAINTENANCE
- BUILDING INSPECTIONS TO INCREASE GUIDANCE THROUGH PROACTIVE QUALITY STEERING
- ENERGY CERTIFICATES FOR BUILDINGS TO BE RENEWED AND INFORMATION TO BE COLLECTED INTO THE REAL ESTATE DATA REGISTER
- CONSUMERS TO BE MOTIVATED THROUGH TAX AND OTHER INCENTIVES

STEERING OF CONSTRUCTION

The energy efficiency of construction projects may be improved through tighter regulations and also by providing good, comprehensive guidance. Regulations represent the minimum requirements; it is permissible and advisable to exceed them. An energy-smart builder wins with, for example, lower heating bills.

A roadmap for the development of building regulations

In 2020, buildings must have near-zero-energy consumption levels. To obtain energy-smart buildings, we must change construction methods for both new building and renovation work. What is needed are tighter energy-efficiency regulations, competent designers, comprehensive advisory services, and different types of energy-smart incentives.

From the beginning of 2012, Finland will assess the total energy consumption of buildings. In practice, this means that, instead of regulating the energy consumption of different parts of a building, the laws will give each building an upper limit for its total energy consumption. In other words, the end result will be regulated but not the means to achieve it. This, in turn, offers the construction industry opportunities to develop innovative approaches and also provides a great challenge to designers and consultants.

By drawing a roadmap for the gradual development and change over the next 10 years, we also support and encourage the systematic development of construction work and its related products. Knowledge is power – and advantageous in the market: this way, businesses may direct their business models and focus, on the basis of appropriate regulations.

FROM SUPERVISION TO CONSULTATION

Building inspection authorities are experts in giving guidance. Municipal building inspectors are in direct contact with those who make decisions on construction. Therefore, the role of building inspection should be wider than at present.

If building inspection provides proactive and advisory consultation, higher quality will follow, instead of just fulfilment of the minimum requirements of regulations. During the processing of building permit applications, building inspection authorities have an opportunity to share information about the impact of different solutions, and advise building developers about energy-smart solutions and good property maintenance.

RECOMMENDED ACTIONS:

- ENVIRONMENTAL CLASSIFICATION SCHEMES TO BE CREATED FOR REGIONS AND BUILDINGS
- INCENTIVES TO BE GIVEN FOR ENERGY EFFICIENCY
- CREATION OF AN EMISSIONS TRADING SCHEME FOR THE REAL ESTATE SECTOR
- EMPLOYMENT OF NEW SERVICES AND MODELS OF OPERATION TO PROMOTE ENERGY-SMARTNESS

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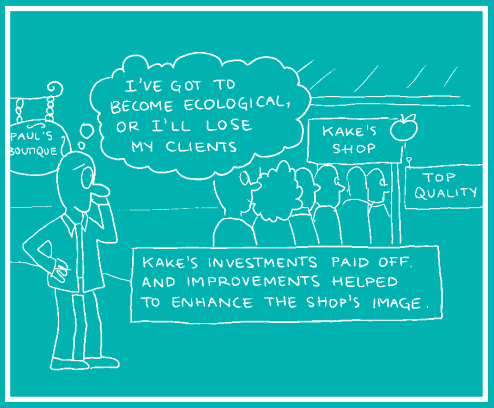


OWNERSHIP AND USE OF REAL ESTATE

Real estate construction is often focused on initial investment costs, overlooking usage costs that will be generated during the life of the property. How efficiently the building is used and what activities take place in buildings make a big difference in their energy use. Smart owners and other users are in a key position to influence this.

An environmental classification system for regions and buildings

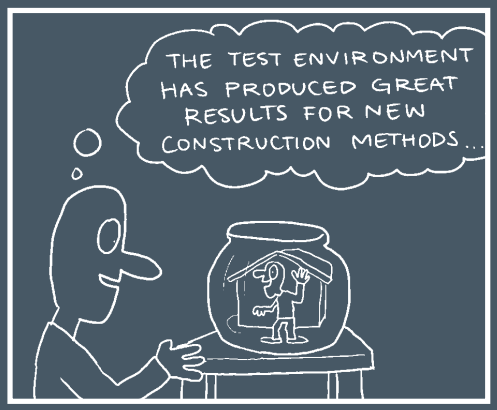
So far, it has not been easy to identify a well-maintained and energy-efficient building in Finland. This is why we need to create an environmental classification system for regions and buildings that is suitable for Finnish environmental conditions and will be internationally acknowledged. A classification system will bring with it many advantages: when a building has a good environmental classification, its usage rate improves, it will yield higher rental income, and its resale value increases. In addition, a classification system improves the energy-efficiency of buildings rapidly and according to market values.

An environmental classification system for regions and buildings will also encourage those who offer building maintenance services to develop eco-efficient service concepts. We need new service models for building maintenance so that owners and users can get all the property and maintenance services they need under one roof, or at least without complicated processes. Therefore, property maintenance services require their own certification system to help service users to select providers, and also to develop service providers' competitiveness in the long run.

EMISSIONS TRADING – NEW INCOME FOR THE ENERGY-SMART?

Once the classification system for regions and buildings has been established, the real estate sector could have its own emissions trading scheme based on greenhouse gas emissions and energy efficiency, similarly to the trading system used in industry. This way, emission reductions and energy efficiency would become a sellable commodity, and those investing in energy efficiency would gain financial benefit from it. Cutting emissions could also result in other benefits, such as additional building permits or leasehold interest.

It is essential to take relative energy consumption into account when sharing emission quotas, to ensure that the already energy-efficient buildings are treated fairly. A good model is found in Britain, where emissions trading is being extended to the construction industry.



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RECOMMENDED ACTIONS:

- TO INCREASE THE AMOUNT OF RESEARCH AND DEVELOP BASIC SKILLS
- TO DEVELOP RENOVATION METHODS
- TO STUDY AND DEVELOP NEW SOLUTIONS IN SUITABLE TEST ENVIRONMENTS
- MUNICIPALITIES TO DRAW UP ERA17 ACTION PLANS AND ENERGY-SMART STRATEGIES
- BUILDERS AND RENOVATORS ARE INFORMED ABOUT ENERGY-SMART CHOICES
- TO ESTABLISH A FOLLOW-UP TEAM

TAKING KNOW-HOW FURTHER

An energy-smart environment calls for ever more knowledgeable energy efficiency professionals. Zero-energy construction, attention to energy issues during planning processes, and wider use of renewable energy sources call for further professional development in all areas of expertise. What we need is multidisciplinary co-operation in putting new knowledge and innovations into practice.

New professorships in energy efficiency

In the past few years, an increasing amount of research has been dedicated to sustainable built environments, both in Finland and internationally. We need a still greater increase if we are to be able to train enough energy-efficiency professionals for the real estate and construction sectors.

Researchers and teachers must expand their horizons and come together through multidisciplinary co-operation across all fields of work and areas of administration. New professorships in the energy efficiency of built environments must be established in the most important universities providing training in the construction sector.

In addition, more people in the construction labour chain should receive training in energy-efficiency issues, all the way from designers to carpentry. Architects and land-use planners have a special need for this kind of new knowledge, as they have a great impact on energy-efficiency management.

From the customer and property-owner's point of view, it is important that they do not have to look for energy-efficient solutions in several places and that they can find all advice and services for construction, energy solutions, and maintenance under one roof. This calls for broad-based advances in expertise.

TEST ENVIRONMENTS, SPEEDING UP DISTRIBUTION OF NEW SOLUTIONS

We need to move the new expertise from universities out into the wider world as quickly as possible, and that is why the new solutions must first be tried in test environments. Test environments allow for methodological study of new solutions, and energy-efficiency measurements and user feedback can be collected much more quickly and efficiently than with existing buildings.

Testing must be done on a sufficiently large scale. At the regional level, a test example might be the planning of and construction in newly developing city zones, so that people living in the areas would be asked to commit to energy-efficiency measurements in their buildings and reply to questionnaires about their energy use for a certain period. Such an area could become home to an annual energy-efficiency construction show or host to an international 'Oscar ceremony' for energy-efficient buildings in Finland.