ARA mail
The Housing Finance and Development Centre of Finland (ARA)

ARA CHALLENGED ARCHITECTURE STUDENTS

WHAT MIGHT SOCIAL RENTED HOUSING LOOK LIKE IN 2049

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ENERGY-EFFICIENT HOUSING ON FOCUS
GOOD HOUSING FOR ALL
NEW POSSIBILITIES IN MODULAR AND TIMBER CONSTRUCTION
THE ARA-HOME 2049 COMPETITION PROVIDED A FASCINATING GLIMPSE OF THE FUTURE

ARA challenged architecture students from Finland and the rest of the world to envision rented housing in 2049.

A total of 148 competition entries were received from all over the world.
The state of Finnish society and the future of social rented housing in 2049 were the focus of the ARA-Home 2049 design competition, organised by ARA for architecture students. In the design competition, students were asked to envision what Finland will be like in 2049 and what kinds of changes Finnish society may have undergone by then.

They were then asked to design a project based on their vision, showing what social rented housing might look like by that date; this called for special envisioning skills in particular. The area selected for the competition was the Sopenkorpi district in the city of Lahti. Entrants were free to choose any city block in the district as the basis for their design.

The broad interest in the competition was a positive surprise

The ARA-Home 2049 competition was realised as an international student competition in cooperation with three Finnish schools of architecture, the City of Lahti and the Lahti Science and Business Park.

A total of 148 entries were received by the deadline, approximately half from international students. The most far-flung participating countries included Korea, China, Taiwan, the United States and Venezuela. The huge interest shown by students in the competition concept was a positive surprise to all of the organisers. Sifting out the winner from the large number of entries received proved to be a highly challenging but utterly fascinating task.

The entries received were as diverse in their approach as they were numerous. Rather surprisingly, the entries grouped themselves into clear-cut categories according to the building typologies selected as starting points for the competition, and the jury aimed to highlight a range of entries that would be as diverse as possible.

Certain entrants had chosen a comprehensive and systemic approach, calling for the entire Sopenkorpi district to be developed according to a single system. This led to a number of designs rather utopian in scope, considering the normal scale of things in Finland in general and in Lahti in particular. Other entrants took a very human approach to rented housing, creating small-scale milieus. Realism often trumped innovation, and the jury would have liked to have seen bolder departures from the norm.

Old and new buildings, inhabitants of all ages and cultures

Sopenkorpi is a highly diverse city district with buildings of different ages, some of which would no doubt be worth preserving. The competition brief set no parameters for entrants as far as keeping or getting rid of existing buildings was concerned, but in practice those entries that took account of and preserved old buildings proved to be the most credible. In the best entries, the existing buildings were seamlessly incorporated into a new structure, thereby creating an interesting and varied cityscape with historical layers.

The entrants also found themselves addressing challenges posed by the ageing of the population and multiculturalism. Most entrants had embraced these as an opportunity, basing their housing concepts on barrier-free access, communality and heterogeneous housing. Some entries brought a truly fresh new breeze to the field of Finnish housing construction. It would be good to see the ideas presented in them used in the construction of today.

The best entries took a broad view of the task

Several entrants had been inspired by technological advances, including
the integration of energy production in the residential buildings themselves. In most of the entries, energy economy was allowed to dictate the appearance and orientation of the buildings, and some entries boldly proposed fairly new techniques and materials.

Interestingly, very many entries focused on the integration of food production with housing, featuring parts of courtyards dedicated to horticulture and greenhouses on roofs and balconies. It is clear that local food and a healthy, vegetable-rich diet are part of our future!

The entries judged to be the best provided an answer to practically all of the questions presented in the competition brief. Their designs began with a clear overall concept on which the actual physical design was based. In the best cases, the overall concept provided a backbone for the entire project and a logical basis for all of the solutions presented. The jury particularly appreciated those entries that solved the issues presented on the scale of the Sopenkorpi district, but in such a way as to indicate the possibility of scaling up as required.

Prizes and honourable mentions:
First prize EUR 5,000: "HOMER”, Mikki Ristola, Aalto University
Second prize EUR 3,000: "OUR NEIGHBORHOOD", Joakim Breitenstein, Aalto University
Third prize EUR 2,000: "ARCHITECTURAL VILLAGE", Kentaro Mabe, Tampere University of Technology / Tokyo Metropolitan University
Purchase EUR 500: "IN BETWEEN", Minna Ahtiainen, Aalto University
Purchase EUR 500: "VILLAGE PEOPLE", Otto Autio, Jukka Kangasniemi, Kaisa Karvinen, Kristian Kere, Rikka Leivonen ja Santeri Räisänen, Aalto University
Honourable mention: "APPLE FACTORY", Pasi Mänttäri, Tampere University of Technology
Honourable mention: "OFF THE GRID", Hung Pin Chen, Nuo Wang, Yan Aung, National Taiwan University of Science and Technology and Yan Aung, Cal Poly Pomona
Honourable mention: "IIIII", Kuisma Rasilainen, Aalto University
Honourable mention: "URBAN PLEXUS", Michael Tuzzo, John Wightman, University at Buffalo School of Architecture

AWARD-WINNING PROPOSALS

1. Homer
A diverse, consistent proposal that combines communal spirit with ecology and includes old structures in an organic, unforced manner.

The proposal of MIKKI RISTOLA, “Homer”, was nominated by the jury as the overall winner of the competition. His entry is a diverse, consistently justified presentation of what housing may look like in the future. The entry features a conceptual building type that blends community with ecology, and a flexibility that makes for a vibrant cityscape.

Old buildings are comfortably accommodated in the whole, and variable urban spaces on a human scale are created between old and new. Mixing functions and bringing common spaces into residential buildings creates an environment where it is easy to imagine that people would enjoy comfort and wellbeing. (photos: page 1 and 2)

2. Our neighbourhood
A thorough, believable and cheerful proposal that emphasises ecology, communal spirit and food production.

JOAKIM BREITENSTEIN took second place in the competition with his work “Our Neighborhood”. This entry is somewhat akin to the winning entry, and also ticks all the boxes given in the competition brief with distinction, even if only one building type is used.

The design is well motivated, focusing on ecology and energy issues. The presentation is refreshing, and the narrative set in the future is insightful. That the entrant has thoroughly addressed the competition brief is evident in its attention to detail, down to home layouts, and the work is convincing and professional. (photo: page 3)

3. Architectural Village:
A fabulous vision of communal living that makes use of existing building stock.

KENTARO MABE, was awarded third place in the competition for his proposal, “Architectural Village”, that presents a fantastic vision of a new use for old building stock, by harnessing it as a platform for communal living.

The entry’s presentation is of high quality. It vividly shows how an old industrial building can be converted into an intimate and vibrant village that harks back to the early days of urban construction. Under a wide glass roof there is an eco-village, a living organism that adapts to its users. The entry also presents a convincing technical description of how this complex would operate. (photo: page 5)
The jury decided to buy two meritorious entries, one of which, “Village People”, is a fine example of the new city block concept featured in many entries in the competition; the principle in this concept is to use small-scale cube-shaped buildings to create a living urban space and to enter into dialogue with the old building stock. The entry is pleasant in its scaling, and the home design is skilfully executed.

“Village People”

The jury members:

SAMPO VALLIUS, Development architect, ARA, Chairman
HELENA BERG, Head of communications, ARA
MARKku HEDMAN, Professor, Tampere University of Technology
HANNU HUTTUNEN, Professor, Aalto University
JOUNI KOISO-KANTTILA, Professor, University of Oulu
MARKus LEHMUSKOSKI, Town planning architect, City of Lahti
VESAs IJAS, Head of Development, Lahti Science and Business Park

Bought entries

Four entries were awarded honourable mentions in the competition. These entries are very different from one another, but each represents the absolute best in its own category. “Apple Factory” is somewhat sombre in its presentation, but in its content and form is a fine example of a utopia where food production and new materials play key roles.

“Urban Plexus”, on the other hand, was the most insightful of the megastructure proposals and, in terms of scale, a rather credible effort at presenting a new structure to link the entire district and its existing buildings into the city of the future. (photo on the back cover)

“Off the Grid” was by far the best of the numerous low-rise plans submitted, demonstrating considerable professional skill and a focus on the brief. (photo on the back cover)

The proposal “IIIII” is in a class of its own as regards presentation, and its sculpture-like buildings conjure up a fascinatingly ethereal and purebred world, even if its realism suffers slightly due to its artistic approach. (photo on the back cover)
ARA PROMOTES ENERGY-EFFICIENT HOUSING AND THE USE OF RENEWABLE ENERGY

Supporting energy-efficient housing is one of ARA’s main objectives. The best results are achieved when account is taken of energy conservation at the design stage.
ARA promotes use of renewable energy and the improvement of energy-efficiency, since this benefits both residents and property owners financially, and increases comfort of living.

ARA has participated in numerous research and development projects for the promotion of energy-efficiency. It recommends taking account of energy-efficiency at the earliest possible stage, both in new construction and renovation projects. ARA-constructed projects make use of renewable energy in the form of solar energy and ground heat systems, among others.

**Reasonably priced solutions through solid planning**
ARA takes a positive view of the use of renewable energy, believing that reasonably priced solutions can be achieved through good project planning. Use of renewable energy is increasing as the costs of the required systems fall. The potential of each system must be determined individually. Each system and solution’s cost/benefit ratio is the decisive factor. Solid design and high-quality construction are prerequisites for the appropriate and sustainable use of new technologies and products. Cooperation between various actors becomes more important as the technical complexity of projects increases.

Passive house projects can already be implemented as ARA construction. The definition of a passive house includes low heating energy and primary energy needs, and a low air-tightness value.

At present, building zero-energy houses, or houses near to zero energy consumption, is challenging when based on ARA construction, but not altogether impossible. In the future, the costs are likely to decrease. We also anticipate an increase in training on the subject. Legislation related to construction can either obstruct or facilitate zero-energy construction. Plus-energy construction is currently not possible in ARA’s housing production. However, we need to take one step at a time on the way to developing solutions that take better account of renewable energy and energy-efficiency, since all future new construction must have close to zero-energy level.

Where possible, ARA supports pilot projects in the use of renewable energy and energy-efficiency, alongside normal ARA construction.

**Renewable forms** of energy include solar, wind, water and bioenergy, as well as ground heat and tidal and wave-power energy sources. Bioenergy includes ligneous fuels, field biomass, biogas and the biodegradable parts of recycled fuels. Conditions in Finland are unsuitable for the production of wave or tidal energy, making these forms irrelevant to our energy production.

Motiva

The construction and real estate industries play a key role in the improvement of energy-efficiency in Finland. Energy-efficiency is achieved by attaining the minimum possible levels of heat, electricity and water consumption. Use of renewable forms of energy is also recommended.
NEW POSSIBILITIES IN MODULAR AND TIMBER CONSTRUCTION

Construction based on prefabricated modules could solve many problems in construction.

Modular construction provides new solutions for housing, alleviates the rise in construction costs and improves the quality of construction. This technique can shorten construction times, level out seasonal fluctuations in construction, improve construction quality and ease labour supply issues.

Reasonably priced housing construction and renovations can already be implemented using various modules, but this requires new thinking during the project planning phase. Modular construction is only moderately used in new construction and renovation projects carried out by ARA, but the organisation believes that volumes will grow in the future. Growth in volumes depends on the willingness of customer organisations and on solutions implemented by suppliers, as well as the ability to market such solutions.

More options on the market
Timber construction has long traditions in Finland. In the future, the volume of timber construction will grow in ARA-constructed housing and within the renovation of ARA’s stock of buildings, as timber modules and elements develop. The competitive price of timber construction enables ARA to use various solutions.

ARA hopes that modular and timber construction will bring more project implementation options to the market. Efficiency and environmental values are important considerations when designing solutions, which also need to be easy to order. ARA believes that new actors will enter the market as demand grows, which will increase the competition.

Industrial building modules are prefabricated in factory conditions as far as possible. The benefits of industrially fabricated building modules include controlled manufacturing conditions and uniform production quality.

Modular construction differs from regular construction in that the modules are completed as far as possible before transportation to the construction site, reducing the amount of on-site construction work needed. In modular construction and increasing the level of prefabrication, the key challenges arise from changes to the design process and logistics.

Industrial renovation solutions, Finnish Association of Civil Engineers RIL 258-2011
Increasing the use of timber in construction will reduce Finland’s greenhouse gas emissions. The greatest potential for growth in timber construction lies in large-scale construction, such as block construction, the energy renovations of suburban facades and the construction of additional floors and other supplementary construction.

Ministry of Employment and the Economy, 2012

Modular construction can lead to reasonably priced housing.
An accessible living is good for everyone, since anyone can be injured and require accessible environment even if only for a while.

Accessibility means easy access for people with various disabilities to a home, space, service or other property. Accessibility entails many objectives related to sizing, such as taking account of wheelchair users in construction design, as well as numerous considerations related to people with impaired sensory perception. For such people, accessibility can mean good acoustics with no echoes, or clear signs and sufficient lighting.

**An accessible environment is good for everyone**

Accessibility is an important consideration in all construction work, since anyone can be injured and require movement aids, even if only for a while. As a rule, an accessible environment is good for everyone, and the importance of accessibility will be emphasised further as the population ages.

To enable the growing number of aged people to keep living in their own homes, more than 700,000 new accessible homes will be needed in Finland by 2030, according to an estimate presented in the report published by the Development Programme for Housing for the Aged in 2012.

State investments are required to reach that goal, and ARA will play a key role as a promoter of social housing production. We cannot afford to build one more non-accessible home.

ARA wishes to promote accessibility in homes and the living environment, by requiring an accessibility report for each funded property. Project steering seeks to evaluate various aspects of accessibility, such as the accessibility of housing locations and the internal accessibility of homes and residential buildings. In housing for special-needs groups, accessibility is even more crucial.

ARA is involved in the development of accessibility tools and databases, such as the accessibility assessment tool IT-Arvi and the ARVI database, which is being developed into a data bank in service of accessibility planning.
Towards a new communality

The change from an individualistic society towards a new communality, or the need for such a change, has been much discussed recently. From the perspective of housing, communality refers to factors such as a sense of security and solidarity within one’s community and as part of it.

Social exclusion, loneliness and perceived threats to safety in the immediate environment are significantly reduced when people know their neighbours, and active participation in the community creates positive content in a person’s life. On the other hand, communality must be voluntary, which is why everyone must be given the opportunity to enjoy enough privacy. A good living environment includes public, semi-public, semi-private and private spaces.

ARA has been involved in several projects involving the study and development of communality. For our part, we seek to ensure that ARA-funded properties include places that naturally foster voluntary communality. Communal spirit cannot be forced, and no built environment can generate it automatically; rather, the environment must enable and facilitate its creation. The surest way to create a communal residential property is for residents to be familiar with each other from the past, or to have other things common. At best, a living environment that enables communality can even promote tolerance and help people to accept differences.
Real estate development is activity aimed at increasing the value of a single property, or an area and its properties, through investment. Objects of real estate development can include vacant land or water areas, lots belonging to the property, or buildings or parts thereof located on the lots. Real estate development can focus on a planned addition to a property or an existing property and its parts.

The Finnish Association of Building Owners and Construction Clients (RAKLI), 2012
The prices of owned and leased lots in ARA-financed projects are regulated according to regional price ceilings. A property’s location and construction rights have a significant effect on price. City plans and lots should offer a sensible framework for the realisation of reasonably priced housing construction. In the future, lots should also enable the use of renewable energy solutions, either at the construction stage or through retrofitting. For example, the efficiency of solar energy use is affected by the buildings’ orientation, the installation angle of the systems and shadows cast by the surrounding environment.

ARA hopes that sufficient lots will be allocated for the construction of reasonably priced housing. Municipalities, real estate owners and construction firms play a key role in this matter. ARA recommends that the possibilities of using renewable forms of energy be considered at the earliest possible stage.

**Modifiability increases versatility**

ARA is interested in the modifiability of residential buildings. The entire life span of a new building should already be considered at the design stage, since modifiability allows buildings to cater to changing demands.

ARA recommends that, whenever possible, attention be paid to a building’s modifiability. As a rule, modifiability extends the life span of a property. In the future, ARA construction will probably also emphasise life-span thinking in other ways. The trend is towards more eco-efficient construction that takes account of environmental effects.

**A bold attitude**

In its operations, ARA comes face to face with the problems caused by declining residential areas and ageing residential properties. Demolition of residential buildings is one method of developing the building stock, in addition to new construction and the renovation and sale of old buildings.

All development alternatives are aimed at adjusting the stock of buildings to demand. Each solution must be based on the facts and an overall view of the situation. The demolition of homes evokes conflicting emotions. Nevertheless, the fact is that little-used buildings of the wrong type and in bad shape become a burden to both their owners and the state, as the ability of owners to meet the costs decreases with diminishing rental incomes and increasing repair costs. ARA recommends a bold attitude and, if necessary, use of external assistance in the development of old building stock.

In addition to renovation and improvement, ARA believes that the volume of demolition operations will grow in the future. However, this requires the rationalisation of practices within the industry and an improvement in the reusability of demolition waste.

Where possible, ARA supports pilot projects related to innovative real estate development, alongside normal ARA construction.
The aim in sheltered housing is to provide the most normal home possible, close to support services.

The basic task of ARA is to promote and support reasonably priced housing and its development, in cooperation with ARA’s partners. ARA supports and funds homes, houses and other premises required for housing. In addition to housing, people with special housing needs require various services, care and attention.

Various terms are used when referring to housing services for special needs groups: sheltered housing, sheltered housing with 24-hour assistance, and supported housing. In practice, such housing is either sheltered housing with 24-hour assistance, where the resident has round-the-clock access to the assistance and care he or she needs, or supported housing, in which the resident requires support and guidance in order to live independently. Concepts used within housing services are based on legislation.

Housing policy promotes the opportunities of all population groups to obtain housing appropriate to their situation in life, and the opportunity of residents to influence matters related to housing.

It is important to base the housing arrangements of people with special housing needs on the characteristics of normal houses and housing, making access to adequate support services the decisive factor. Even people who need a considerable amount of help and care can live in their own homes, if they receive the help they require regardless of the time of day.

**ARA supports special-needs housing**

ARA supports the housing of special needs groups, by granting investment grants and interest subsidy loans aimed at improving the living conditions of such groups. The purpose of support is to increase the availability of reasonably priced rental homes suitable for the housing requirements of persons with special needs, and to improve the living conditions of such persons.

The amount of each investment grant is decided by ARA, on a case-by-case
It’s about us and a normal block of flats”, said a young mentally disabled woman in the workshop organised by the “At the heart of everyday life” project in Lahti. She is not the only person to dream of living like normal people, in a normal neighbourhood with a partner of her own choosing.

In May 2012, ARA launched the project for investigating new ways of arranging the housing and lives of people with special needs, in local communities.

The main ideology behind the project can be encapsulated in four concepts: the user’s voice, personal choice, potential for activity and support. The “user’s voice” refers to the fact that homes and local communities cannot be designed without consulting their future residents. People themselves know best what they want from their housing and lives. This also means that future residents must be involved in all stages of the design process.

User-oriented evaluation of requirements
A decision on the housing arrangements of a person with special needs must be preceded by an individual evaluation of which form of housing is most appropriate for each person.

During the selection of the form of housing, account must be taken of the person’s own wishes and needs, and a picture must be formed of how the person will cope with everyday situations and activities.

A user-oriented evaluation of requirements can be based on tools, indicators and other aids for determining a person’s ability to function. The overall picture comprises several components: the person’s living environment, life management skills, cognitive and emotional resources, social skills, physical condition and state of health.

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Under the project, housing is examined from the perspective of the potential for activities made possible by the environment. The key question is what housing, leisure-time and employment opportunities exist within the local community, and what opportunities could be created.

It is also important to consider how the support and services required by people can be linked, in order to support living as a whole. In addition to official services, the project examines the possibilities created by unofficial support and resources. An intriguing question is how separate homes can be built into networks where the residents support each other in a natural way.

The project’s implementation forms part of the housing programme for people with mental disabilities. The programme’s objective is to end institutional care for people with mental disabilities in Finland, in stages.

People themselves know best what they want from their housing and lives.
Finland’s first net-zero-energy blocks have been erected in Kuopio and Järvenpää. A student residence with 47 flats was constructed in Kuopio and a building of 44 homes for aged people with memory disorders in Järvenpää.

Both properties opted for ground heat and solar energy for energy production. In addition, the availability of free energy was exploited in both buildings, by choosing elevators that store and use the energy created during braking. In the summer, the flats can be cooled with a ventilation device that uses cool air from a ground heat well. The block built in Järvenpää is able to sell extra energy to the neighbouring building in summertime.

With the energy regulations on housing construction tightening up, ARA had the goal of providing an example of net-zero-energy block construction. The demolition process for old building stock made the project even more interesting for ARA. Construction costs were kept at a moderate level and the buildings are fully accessible.

Sensors and monitoring systems were installed in the property. The data collected by these will be used in research and development. The data will also be used to optimise the operation of the systems.

The project received development funds, an investment grant, an interest subsidy loan and demolition subsidies from ARA.
Järvenpään Mestariasunnot boldly set out to construct Finland’s first net-zero-energy blocks.

The calculations performed by VTT and the open-minded attitude of ARA inspired faith in the project’s success. Subsidies from ARA, Tekes and Sitra covered the costs of the development project required for the creation of something new. Kuopion Opiskelija-asunnot Oy also participated, under a project of its own.

Since there were no ready-made solutions for zero-energy construction, the preliminary survey stage was particularly important. We drove around Finland, collecting crumbs of information and experience. Although we found technological devices, it was a challenge to combine everything into a single, functional whole entirely new to Finland.

Developing entirely new things is akin to exploration, including both the uncertainty and excitement of creation. In retrospect, the zero-energy project was an inspiring experience, but required some determination and even recklessness along the way. A sense of humour was also essential, since things did not always go according to plan – such projects are not for the straight-laced!

A project monitoring group was set up, to monitor the functionality of the building and make the necessary adjustments. This development project will give us the wisdom of hindsight in building future projects. During the course of the project, we have obtained a great deal of new information on how energy should be produced. This was also an inspiring voyage of discovery for the subcontractors participating in the project – a few patent applications have been filed.

The industrialisation of energy-efficient products is a challenge for the future, which will open up business opportunities in several fields of construction.

Recognition for the developers

Veikko Simunaniemi was awarded as the most influential person in housing in 2010. The nomination was made through an online poll organised by Nordea, Rakennuslehti magazine and Suomen Asuntotietokeskus, in which nearly 1,500 votes were cast.

The Finnish Association of Building Owners and Construction Clients Rakli simultaneously nominated the company led by Simunaniemi, Järvenpään Mestariasunnot, as Developer of the Year.

The Teknologiasta Tuotteiksi Foundation presented Mestariasunnot with the 2008 reward for the innovative development of rental housing and rental housing models. In 2011, the City of Järvenpää presented the company with the Järkevä sustainable development award for energy-efficient thinking and solutions.

In the spring of 2011, Kuopion opiskelija-asunnot Oy Kuopas and its partners received an award of merit for promoting energy-efficiency in the real estate market. The award was granted for the zero-energy block Asuntola Puuseppä, constructed by Kuopas. This acknowledgement was awarded by the Finnish Fair Corporation.

**CREATION IS INSPIRING**

**Järvenpään Mestariasunnot** boldy set out to construct Finland’s first net-zero-energy blocks.

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**VEIKKO SIMUNANIEMI**

CEO

Järvenpää Mestariasunnot Oy
ONNELAN-POLKU
– TURNING THE OLD INTO SOMETHING NEW

A new, nearly zero-energy building suitable for special-needs groups will be constructed, in place of an old sheltered home at the end of its life cycle.

The main goal of the Onnelan-polku project is to realise a sheltered home suitable for life-cycle housing and housing special-needs groups, with an energy consumption close to zero. In this context, life-cycle housing refers to the possibility for aged persons to keep living at the same address, despite changes in their ability to function. A total of 228 homes for the aged were constructed in the property. The building will be executed by demolishing the existing three buildings in stages and constructing new ones in their place, so that the inhabitants of the demolished buildings will be able to move into the new ones. The project will almost double the combined floor area of the three buildings.

It involves three principal points of interest for ARA: the demolition of old buildings and life-cycle housing and energy-efficient solutions for new properties. The property being constructed is also a significant building complex in Finland in terms of size.

Sensors and monitoring systems will be installed in the property, and the data collected by these will be used in research and development. The data will also be used to optimise the operation of the systems.

The project received development funds, an investment grant and an interest subsidy loan from ARA.

Technological highlights

- E value
- solar energy
- the atrium as a “pre-heating radiator” for incoming air
- technology tiles for bathrooms
- demolition surveys

Energy data

1. **Energy value** (primary energy) (kWh/brm²/a): 60 (target)
2. **Energy-efficiency class** (2013): A
3. **Energy source**: municipal heating + solar energy
4. **Air-tightness value** n50 (l/h): 0,4 (target)

Implementation

**Developer**: Lahden Vanhusten Asuntosäätiö
**Contractor**: YIT
**Main partners**: ARA, Finnish Association of Building Owners and Construction Clients (RAKLI), Finnish Innovation Fund Sitra, VTT Technical Research Centre of Finland
YIT has overall responsibility for the construction of the Onnelanpolku sheltered home. Onnelanpolku is a large-scale project with an energy-efficiency approximately equal to the zero-energy level that will be required around ten years from now. The maximum permitted E value, which indicates the property’s primary energy consumption, is 60 kWh/m² per year.

YIT aims to develop future housing by making use of the experiences gained during the construction of Onnelanpolku. Particular attention has been paid to the reliability of the solutions selected for the concept. As part of development work, all applied solutions will be tested before the property is finished, in order to ensure their suitability for residential buildings.

The energy concept and solutions chosen for the Onnelanpolku sheltered home emphasise overall energy management. All energy solutions have been selected on the basis of accurate modelling, simulation and testing. For the first time, architectural modelling, minimisation of energy consumption, use of renewable energy and efficiency have been combined into a single whole. These solutions have been used in various projects in the past, but this is the first project to combine all of them. The most marvellous thing about the project is YIT’s ability to apply its expertise and competence in such a comprehensive manner.

JUKKA POHJOLA
Region Manager
YIT

“...
As a result of the project, a normal-sized, one-family house, with an E value of zero according to the primary energy requirements set in July 2012, was constructed for the Tampere Housing Fair 2012. The principal construction material used was wood.

The project aimed at conserving energy in all sub-areas. Use of renewable energy and the careful execution of construction work were other important considerations. Forms of energy with weighting factors most advantageous to meeting primary energy requirements were selected for the project. The house is heated by municipal heating and a water-based floor heating system that can be adjusted separately for each room.

Eight square metres of solar collectors satisfy 40 per cent of annual consumption of warm water, with municipal heating warming the remainder. For electricity production, 60 square metres of efficient solar electricity panels were installed on the roofs of the residential and storage buildings.

In this development project, the goal of ARA was to create an example of an energy-efficient single-family home, whose solutions could be modified for use in semi-detached and detached houses and low-rise buildings, while meeting ARA's quality criteria. The floor plan and division

**Technical highlights**
- air-tightness value
- E value
- solar energy
- LED lighting
- home/away switch
- optimisation of natural light
- shadowing
- energy monitoring system

**Energy data**
1. **Energy value** (primary energy) (kWh/m²/a): -1
2. **Energy-efficiency class** (2013): A
3. **Energy source**: municipal heating + solar energy
4. **Air-tightness value** n50 (l/h): 0.3
We became interested in the Lantti house because its structures were manufactured in such a way as to minimise the building’s carbon footprint. Vuores in Tampere was also an attractive neighbourhood. The house is also interesting from a professional point of view, since we work in the HVAC sector.

It is great to be able to monitor the house’s energy consumption online and individually for each room. In a concrete manner, this enables us to witness the effects of our choices on the building’s energy consumption. Technology steers us towards consuming less. The technology is also challenging, and we are only just learning how to use the equipment.

KIRSI RIIHIMÄKI
Resident of the Lantti house
The idea behind the Lantti house was to build a net zero-energy house that would comply with the building code of 2020. We were enthusiastic about joining the pilot project and investigating and designing the appropriate solutions, in cooperation with the team of designers assembled by Aalto University and with Sitra and ARA.

The house's guiding design principles were defined as sufficient insulation and structural air-tightness, use of solar energy for heating water and the production of solar electricity, and protecting the building from over-heating by methods such as optimising shadowing and the size and orientation of the windows. In the design stage, the decision was also taken to equip the building with a monitoring system. The system's numerous sensors and measuring devices track the moisture and temperature conditions within the building's structures, the amount of energy consumed and produced by the building, its interior temperature, air moisture and the carbon dioxide content of indoor air, among other things.

The result of careful construction is evident in the measured air-tightness value of 0.3, a top value for a wood-frame buildings, which helped us achieve the target of zero net energy consumption.

We can state with satisfaction that, despite a tight design and construction schedule, the Lantti house was finished in good time for the Tampere Housing Fair and met all of the requirements set during the design stage. The Lantti house is now home to a family of three. We await their experiences, of living in and using the house, with interest.

Implementation
Developer: TA-Rakennuttaja
Contractor: Arkta Rakennuttajat
Main partners: ARA, Aalto University, Finnish Innovation Fund Sitra

The solutions created for the Lantti house are used in housing constructed by TA

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SAMI LEHTO
Region Manager
TA-Yhtymä Oy

Keeping construction costs under control proved to be a challenge. However, ARA believes that, in the future and in the right conditions, net-zero-energy single-family house projects can be implemented by ARA. Before zero-energy construction solutions can be implemented by ARA on a large scale, particularly in the case of single-family houses, there is still room for development and much remains to be learned about the exploitation of such solutions.

Sensors and monitoring systems were installed in the property, and the data collected by these will be used in research and development. The data will also be used to optimise the operation of the systems.

The project received development funds and an interest subsidy loan from ARA.
THE SUBURBAN INNOVA BLOCK OF FLATS IS BEING RENOVATED INTO PASSIVE HOUSE
Project implementation:
From the beginning, the project involved architectural designer Kimmo Lylykangas and a group of companies, whose products were used to carry out the passive-energy renovation. Paroc supplied the insulation for the elements, Lammin-ikkuna the windows and balcony doors, whereas Recair supplied the centralised ventilation system equipped with a powerful heat-recovery unit. The project’s contractor was Lujatalo Oy. The main partners of the project were VTT Technical Research Centre of Finland, ARA, Finnish Innovation Fund Sitra and Tekes – the Finnish Funding Agency for Technology and Innovation.

Under the Innova passive renovation project, the aim is to renovate a suburban block of flats from the 1970s and to study the potential for energy renovation. The goal was to discover a replicable renovation model for blocks of flats, particularly those built in the 1960s, 1970s and 1980s. Such buildings constitute the majority of Finnish building stock and are highly wasteful in their energy consumption. This made the project interesting to ARA.

The project was launched in 2010, with a competition seeking housing companies or rental buildings that would be suitable for major energy renovation. A block of flats with an exposed-aggregate finish, owned by the rental housing company of the City of Riihimäki, Riihimäen Kotikulma, and built in 1975, was chosen.

As a special feature of the project, the decision was taken to test the TES energy facade prefabricated facade solution, developed in Central Europe and little known in Finland. TES is an abbreviation for “Timber-based Element System”, and the system consists of facade elements with timber frames, which can be fixed on top of a building’s existing outer shell. The elements were fabricated in dry indoor conditions at the Teeri-Kolmio Oy factory and delivered to the construction site complete with insulation, glazing and a finishing coat. They could then be very quickly installed at the construction site. Before the installation of the new elements, the surface layer of the old sandwich elements had to be dismantled and the old insulation removed. In addition to effective moisture risk management during the construction stage, the method’s benefits include an extremely short lead time at the construction site.

To ensure the dimensional accuracy of the elements, the existing structure was laser-scanned and an accurate, three-dimensional model was created of the building. This method allowed
Passive renovation under the Innova project has ranked among the most challenging pilot projects undertaken by our agency.

A number of evident technical concerns and a depressing number of repair needs were immediately apparent. As the commission entailed an innovative renovation method and ambitious energy-efficiency target, it quickly became clear that we would be camping out on this yard for some time.

During the design process, we were surprised to note many good features of the prefabricated block architecture of the 1970s, such as the uniformity of the construction method used in the area, car-free and green-block courtyards, and the pleasing scale of the blocks themselves. During renovation, it seemed preferable to maintain some continuity with the building’s original appearance, even if all parties concerned were hoping for a fairly radical modernisation of the exposed-aggregate concrete block.

We had never worked with a 3D model created by laser scanning, although the method was familiar to us. The model turned out to be highly accurate, and since we began by developing dimensioning principles for the working allowances and seams of the various construction elements, work progressed fairly rapidly in the end. The element manufacturer did an astonishingly accurate job, proving that Finland can boast top expertise in timber construction.

Ultimately, issues unrelated to the new renovation method caused most grey hairs: moisture management at the construction site and the living conditions of residents during the renovation. As we were unable to meet the schedule, we gave up the idea of using different tones in the facade’s plaster fields to create a patchwork effect, and the walls ended up a uniform off-white. Today, I hear that the house is known as the “hospital” due to its light colouring.

KIMMO LYLKYKANGAS
Architect, SAFA
Kimmo Lylykangas Architects

The end result was an extremely energy-efficient renovation of a residential block of flats, meeting the criteria of a passive level and paving the way for renovating Finland’s stock of buildings to the level of energy-efficiency specified in national targets. Indoor air quality also markedly improved, due to the mechanisation of ventilation and new ventilation channels integrated into the exterior wall elements.

The project received development funds, an interest subsidy loan and energy subsidies from ARA.
SHELTERED HOME IMPLEMENTED FROM TIMBER BOX ELEMENTS, USING MODULAR TECHNOLOGY

Solid-timber elements are predicted to boost domestic timber construction.
The sheltered home constructed in Paroalho, Rauma in the autumn of 2012 was a natural step for Stora Enso, along the road of increasing timber construction in Finland. Designed in cooperation with versatile real estate industry specialist Lakea and implemented with solid-timber box elements, the building is an important milestone in the company’s chain of construction projects, of which the student housing constructed in Joensuu and the nature centre Haltia built in Nuuksio, Espoo will be completed and occupied in 2013.

Built in Rauma, this property was the first in Finland to make use of modular technology based on cross-laminated timber (CLT). Using this construction technique, the box elements are prefabricated industrially, in controlled factory conditions sheltered from the elements, before being delivered to the construction site for installation.

In combination with the use of renewable and ecological raw materials, the short construction time enabled by the use of box elements, and the resulting savings, make CLT construction a competitive option for housing. We at Stora Enso believe that it is precisely through industrial, reproducible construction that timber construction will gain a permanent foothold in Finland.

The modular building erected in Rauma is a step forward, not only for Stora Enso and its partners, but also for Finnish timber construction as a whole – a step towards the future.

Matti Mikkola
SVP Wood Products
Stora Enso Building and Living
Peltosaari in Riihimäki is one of Finland’s many suburbs. Suburban development is vital from the perspective of ARA, since suburbs house approximately one million people and contain numerous state-subsidised homes, rental homes in particular. ARA’s interest in suburbs stems from a desire for solutions to deal with the ageing stock of buildings, in which major renovations are imminent and the neighbourhood as a whole needs a facelift.

Municipalities, cities, municipal real estate corporations and non-profit corporations face various challenges in areas where rental homes predominate and whose image may not be the best. The need to renew a neighbourhood and improve its image also applies to Peltosaari in Riihimäki.

Together with other public funders and research organisations, ARA has assessed the challenges posed by Peltosaari. There was much to investigate, and not all of the challenges have yet been solved.

Nevertheless, progress has been made: the social, technological and economic starting points have been charted; renovation, demolition and new construction requirements determined; the current and future financial effects evaluated; first properties renovated, etc. Key measures have been the involvement of residents in the area’s development and the organisation of a general design competition for renewing the area.

The coming years will show how the Peltosaari neighbourhood can renew itself and what form its new image will take. From ARA’s point of view, the fact that actors in Riihimäki are seeking to develop Peltosaari in a comprehensive, long-term fashion is a positive thing. ARA hopes that the experiences gained in Riihimäki can be used elsewhere in Finland.
In finding competencies for this innovative project, a wide net has been cast. We took the opportunity to organise an architectural competition, a method also used in Riihimäki in the 1960s to design the original Peltosaari. Competition entries were judged interactively, by allowing the public to comment on entries on the competition website, before the jury made its decision. This was a novel approach for Finland.

We also enlisted the help of experts from various sectors to evaluate the entries, by requesting statements on the best ones. From my perspective as Chief Town Planning Officer, new ground has been broken and new knowledge and competencies obtained for the entire city, in organising this competition and acquiring funding from Tekes.

Networking with various research communities such as ARA, Tekes, VTT, the University of Helsinki, Aalto University and the University of Oulu has been rewarding and eye-opening. Based on this new information, we have gained support for the objectives and solutions related to developing Peltosaari. Contacts with universities, for example, have now been made and can be reactivated more easily in the future, if required.

The project has necessitated cooperation among the city’s various administrative municipalities. It is intriguing to be part of this development project, where land use planning has been integrally linked to solving the city’s social and housing problems.

A particular challenge we have yet to tackle is the execution of the construction stage. Even at this stage, during the formation of sub-projects and assembling of contractors, the scope of a Chief Town Planning Officer’s duties is considerably wider than normal. Broadening one’s expertise is both interesting and challenging. The meeting of and interaction between different professions is stimulating and promotes creativity.

RAIJA NIEMI
Chief Town Planning Officer
Riihimäki
The block concept functions as a platform that emphasises communal spirit. The intention is to keep the block’s inhabitants as heterogeneous as possible.

The CIN block project is a study in a completely novel housing and service concept at block level, where a mixed structure of normal and special needs group housing is combined with extensive block services and functions.

Through modular architecture, the goal is to implement a viable, completely accessible residential property that promotes communal living. In addition to normal rented housing, the block includes housing for students and senior citizens, as well as assisted living apartments that provide round-the-clock care.

Services and activities that support housing and communality have been developed for the block, such as a block laundry, local travel centre, communal “block knots” in staircases, a market hall and a network of internal pedestrian streets. The block courtyard is designed as a genuinely vibrant, year-round enabler of activities and block management is intended to develop into a new kind of system for supporting people.

A diverse and heterogeneous residential structure will develop the block into a vibrant, pulsating locus of life at all hours, enabling a safe and ecological urban lifestyle through its comprehensive offering of services. In the best scenario, different age groups will aid one another and various operating models based on trading services will develop within the block. The study and facilitation of such models through environmental psychology methods is one of the project’s cornerstones.

The block also aims at a low number of cars, since most residents will be carless by nature and the block is optimally located with regard to public transport. What makes the project extremely interesting for ARA is the possibility to create a scalable concept that can be replicated in smaller localities as well. Mixing of different management methods and the use of industrially pre-fabricated residential modules in its construction make this project unique.

New actors in the project
The CIN innovation block began with the CityInnoNets research project, directed by Aalto University. This project studied the formation of value networks and
network management in the spread of urban innovations. Joined by Foundation for Student Housing in the Helsinki Region (HOAS) and Asuntosäätiö, a corporate consortium formed for the research project, consisting of Neapo Oy, S-asunnot Oy, Hoiva Oy and Helsinki Regional Transport Authority HSL, decided to test an urban innovation – novel block-level housing. This had been developed in a value network through a pilot development.

A block in Jätkäsaari, Helsinki was chosen for the pilot development, and the consortium has filed an application to reserve the lot for this purpose.

Other partners in the project include Seulo Palvelut Oy, a specialist in food transport, with Hedman & Matomäki Architects as the developer of the concept’s modular architecture and Movense Oy taking charge of the development of the housing and service concept.
The Housing Finance and Development Centre of Finland, ARA, has major responsibility for the implementation of Finnish housing policy. ARA belongs to the administrative branch of the Ministry of the Environment.

ARA grants subsidies, grants and guarantees for housing and construction and controls and supervises the use of the ARA housing stock. In addition, ARA participates in projects related to the development of housing and expertise in the housing market, and produces information services for the industry.

ARA is an expert partner, developer and moderniser of housing and promotes ecologically sustainable, high-quality and reasonably priced housing. ARA’s operating principle is: everyone is entitled to comfortable housing.

Read more: www.ara.fi