Ellebo Garden Room, Ballerup
Overall winning project of the Nordic Built Challenge Architectural competition

Active Roofs and Facades in Sustainable Renovation

A Nordic Innovation Initiative for development of Active Roofs and Facades as part of Sustainable Energy Efficient Renovation

NORDIC BUILT

Active Roofs and Facades in Sustainable Renovation

The Nordic Built "Active Roofs and Facades" project is supported by Nordic Innovation allowing strong development of leading Nordic competences in the area of building renovation. This is achieved by creating transnational Public Private Partnership models to support the development towards nearly zero energy building solutions and associated performance documentation – which is required in the EU building directive.

The proposed cooperation with the building industry on developing models and the demonstration of "Active House" based sustainable renovation will create a strong Nordic alliance.

The project runs from 2014 to 2017 and will involve companies which are represented in the Nordic countries and companies from the international Active House Alliance, www.activehouse.info . The development will use the best transnational competences and networks, creating greater possibilities to export technology.

The background of building renovation in both Nordic and European projects, where actual energy use is quite often 30-40% higher in practice compared to what was expected from calculations and where innovative solutions are seldom used, is very much connected to the way the building industry is organised. Here consultants will normally only want to operate in a conservative way, because they are not only selling their expertise, but also the insurance that goes with it, and also because consultants fees have been considerably reduced, so it is common to work with well-known large suppliers, who can contribute to large parts of the design process. This means there is a tendency to not choose the most energy efficient solutions, but to allow more mediocre and old fashioned solutions, that the suppliers prefer. Also, because it is common knowledge that detailed performance of equipment in practice is never controlled, then there is no incentive to perform better, and higher energy use will often be explained by the user behaviour.

A main issue of the proposed Nordic Built project will be to realise the renovation projects in a much better way and secure positive involvement of consultants, so they can be more proactive, e.g. by full scale testing of innovative solutions before large scale implementation, and by monitoring key performance indicators as a basis for negotiating guarantees of performance results as part of the overall procurement process, something which also might be used to avoid normal tendering in connection to development of renovation projects.

An important challenge is to introduce holistic oriented demands in the so-called Nordic Built Charter in practice in involved demonstration projects. See: http://www.cenergia.dk/da/images/Nyheder/2014NordicBuilt/150108nordicbuilt.pdf

Added value in Nordic Built Active Roofs and Facades in Sustainable Renovation

Coordinated by the Danish energy specialist company Cenergia, the project will utilise the results from the recently finalised EU-Concerto project Green Solar Cities (www.greensolarcities.com).

These results will be presented in a book by Routledge/Earthscan in early 2015, see: http://www.routledge.com/books/details/9780415731195/

Main results from Copenhagen are illustrated in the two small videos below: http://vimeo.com/98926904 and http://vimeo.com/98926905

Main features of the workplan

1	To work along side the Active House Alliance (www.activehouse.info) aiming to involve Nordic best practice producers and use the Active House Specifications in practice. Here the Finnish company ZED Consult will give a special input whilst at the same time comparing existing certification schemes like LEED, Bream and DGNB.
2	It is our belief that Active Roofs and Facades will be a new trend for the future, and by realising testing of best practice solutions in all the 5 Nordic countries, will lead to an improved aim to implement these solutions in practice.
3	The VTT organisation from Finland will work closely together with the large metallic roof and façade producer Ruukki in the project. Special focus on avoidance of cold bridges in constructions.
4	Monitoring and documentation work will be realised in a cooperation between VTT, Cenergia and the University of Iceland as the main partners, also using Active House Specifications.
5	Both innovative and best practice solutions will be full scale tested in cooperation with the housing association, KAB (DK), which will realise one of the 5 Nordic Built Challenge projects in practice and the WSP Group working with the housing company Trianon in Malmø, as basis of later implementation of sustainable renovation in Denmark and Sweden. A special focus on metallic roofs also for Denmark, where it is not used so much, but has benefits for solar panel integration. And innovative low cost glass-glass PV panels with a long service life will also be introduced in cooperation with the Danish company Gaia Solar.
6	Concepts of Active Roofs and Facades in connection to Smart Grid School Renovation will be implemented in cooperation with the city of Copenhagen and their large scale school renovation plan, which aims at renovation of all schools in connection to the Copenhagen Climate Plan, which aims at CO_2 neutrality by 2025. A new approach will e.g. include combined use of solar thermal and PV as a “solar energy combined heat and power” solution, which can work in an ideal way together with the large combined heat and power (CHP) plants in e.g. Copenhagen.
7	The new decentralised heat recovery ventilation (HRV) solution developed for housing renovation by the Danish companies Øland and Ecovent will be full scale tested and documented. Innovative features that will be introduced are window integrated inlet of air, use of a new type of “automatic filter shift box” which only need to be exchanged every 10 years, and use of a new intelligent control device which allows for continuous registration of airflow and electricity use through the internet, which at the same time secures reading of the mean seasonal factor of performance (SFP) and general survey of operation.
8	And as an alternative there will be a special focus on compact window integrated HRV solutions both for housing and schools. The benefit here will be much lower total costs due to the avoidance of large amounts of duct work, but the challenge include an optimised operation in correspondence with a minimum air exhaust possibility from wet rooms based on humidity sensors, and besides this handling of condensate from the used air in a way that does not create problems.
9	In Norway the building renovation specialist company, Høyer Finseth, will work with full scale testing of best practice solutions and will at the same time work with the solar thermal panel producer AVENTA.
10	Besides there will also be full scale testing of best practice solutions in Finland and Iceland, here working with VTT, Demos and University of Iceland.

Ellebo Garden Room

Winner of the Danish Nordic Built Challenge international architectural competition, “Ellebo Garden Room” by Adam Kahn Architects from London, aimed for realisation in Ballerup west of Copenhagen from 2014.

Financiation by the Danish Social Housing Fund makes a high quality solution possible.

There are examples of projects where facade or roof elements with integrated features have been used for renovation, e.g. in Austria, Germany, Denmark and Norway. In these projects the solutions have been developed case by case, and no general solution exists. As the existing buildings are always individual, the specific characteristics will have to be taken into account in any case, but the project team is confident that an ideal solution can be developed, which will integrate the most important features required in typical renovation projects. The project will develop a concept that will fulfil the typical renovation needs of the Nordic buildings that are most often in need of renovation.

Winning renovation design by Adam Kahn Architects from London, UK

Interior of apartment Ellebo today

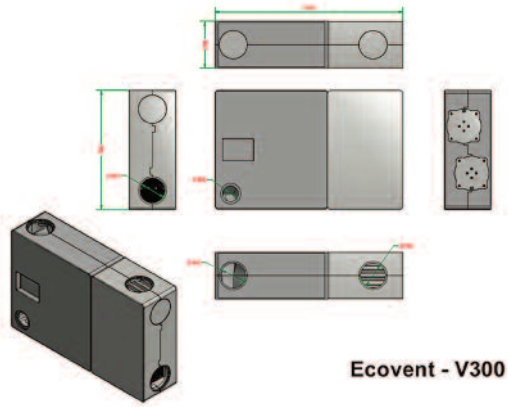
Ellebo today (before renovation)

Window integrated heat recovery ventilation in Sydhavnen in Copenhagen, 2013. The current tennant was very satisfied, not only of the heat recovery, but also because there was absolutely no noise and the combined injection of paper granulate insulation in the floors along the facades ensured a much lower air leakage than before. Each of two units only uses 5-6W of electricity when providing approx. 50-60m³/h of 95% preheated fresh air.

Work on innovative ventilation solutions with heat recovery

Demonstration of improved decentralised heat recovery ventilation with low electricity use.

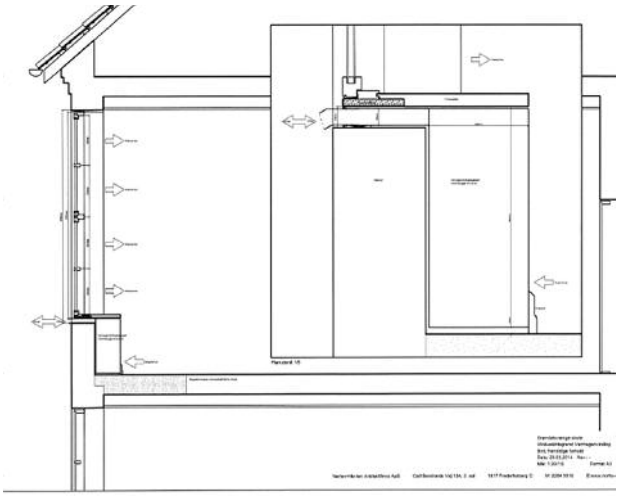
Here a decentralised HRV system from Ecovent / Øland is mounted in connection to urban renewal at Gl. Kongevej in Copenhagen



Window integrated HRV unit with Infilter. Automatic filter exchange box secures service at 5-15 years intervals

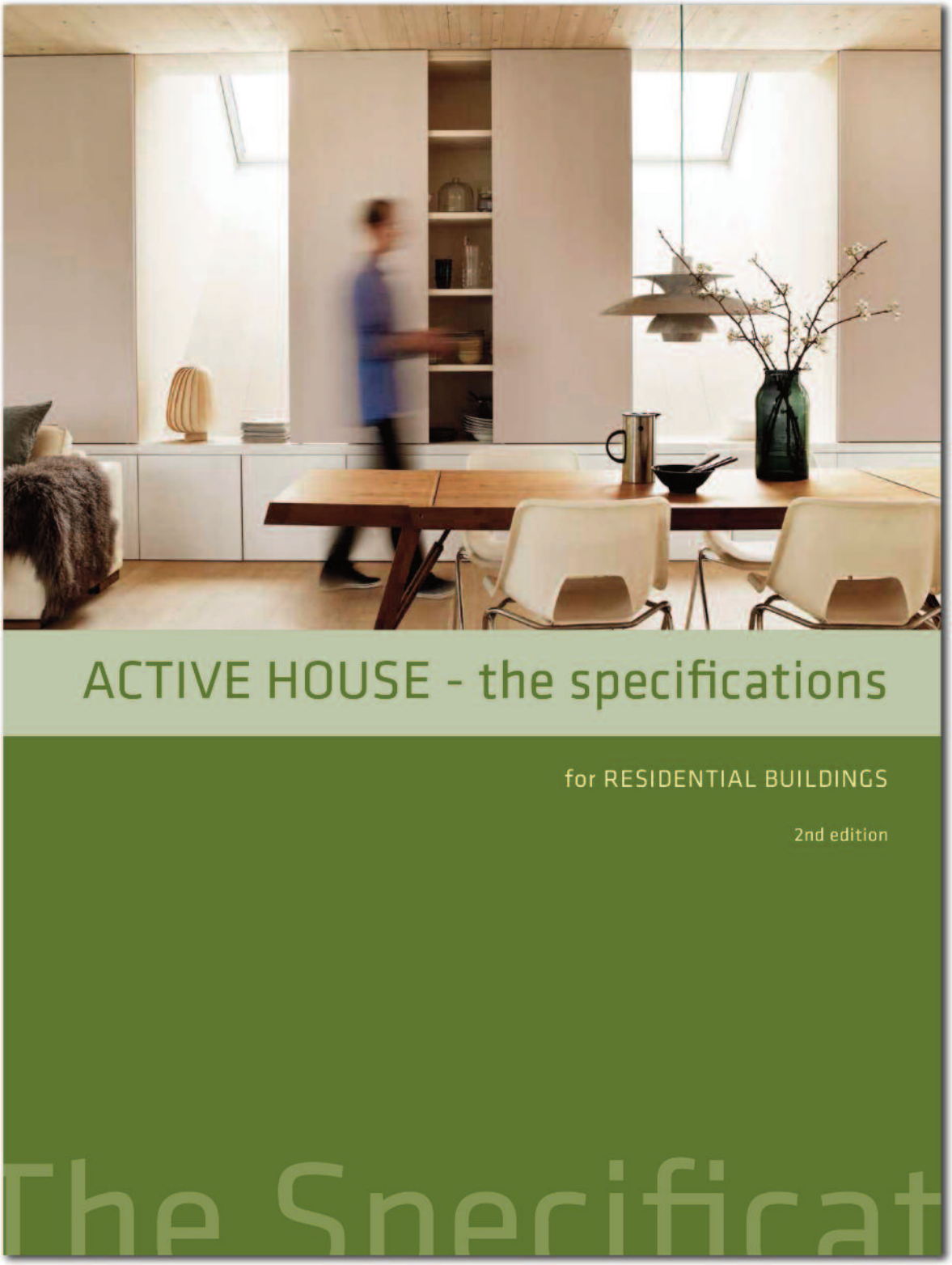
School facade in Copenhagen with window integrated heat recovery ventilation

The window integrated heat recovery ventilation technology installed in a Copenhagen school as part of the Nordic Built project. Here each of 3 HRV units provides 200-250m³/h of air



Window integrated HRV at Grøndalsvænge school in Copenhagen. A very high saving of electricity use is possible with this technology

Active House Specifications



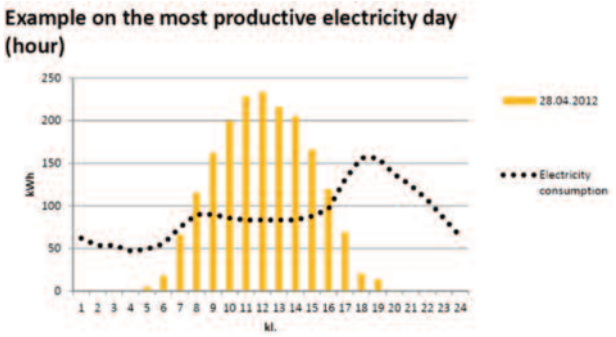
The Active House Specifications are useful as basis of designing the nearly zero energy buildings of the future incl. performance documentation. See: www.activehouse.info

PV and Solar Energy Combined Heat and Power

Example project from EU Green Solar Cities Concerto project in Valby with solar energy combined heat and power.

Hornemannsvænge in Valby is a large concrete housing retrofit project, with 288 apartments. This is the finished renovation where 100m² PV modules for each of 6 housing blocks were made at a competitive cost.

100m² of solar thermal collectors for DHW was quite costly at €800/m². The combined production of solar heating and solar PV fits very well with the CHP based district heating system in Copenhagen.



Danish PV legislation from 2012:
When PV is used immediately (in the hour it is generated), you get the same energy saving value as regular electricity.

When PV electricity is not used directly, it is sold to the grid at a considerably lower cost.

Kickoff meeting with housing association KAB at Ellebo in Ballerup

Project coordinator Peder Vejsig Pedersen from Cenergia talking to Stephan Krabsen from the Danish association of Sustainable Cities and Buildings, FBBB (www.fbbb.dk)

The winner of the Nordic Built Challenge International Architectural competition Adam Khan from the UK also participated in the project kickoff meeting in Ballerup.

Inspection tour at the Ellebo housing scheme in Ballerup, which will undergo extensive renovation.

Due to the Copenhagen Climate plan to be CO_2 neutral in year 2025 it is now accepted that aesthetically integrated PV solutions are allowed to be seen from street areas.

Here you can view a small guideline from Copenhagen municipality showing the very successful PV-integration project Søpassagen in the centre of Copenhagen. (www.kk.dk/solceller)

Site visit at Søpassagen, where the responsible architect Klaus Boyer Rasmussen from Solarplan presented the project.

NORDIC BUILT

We, the Nordic building sector, will join forces and capitalise on our common strengths to deliver the sustainable solutions the Nordic region and the world demands. The time is now and the principles of Nordic Built Charter will lead the way.

OUR COMMITMENT

We commit to taking leadership and implement the Nordic Built principles in our work and our business plans. We commit to taking the necessary actions to deliver competitive concepts for a sustainable built environment that benefit users, the building sector, our region and the world.

OUR NORDIC BUILT PRINCIPLES

WE WILL CREATE A BUILT ENVIRONMENT THAT:

01 Is made for people and promotes quality of life

02 Pushes the limits of sustainable performance, as a result of our innovative mind-set and high level of knowledge

03 Merges urban living with the qualities of nature

04 Achieves zero emissions over its lifecycle

05 Is functional, smart and aesthetically appealing, building on the best of the Nordic design tradition

06 Is robust, durable, flexible and timeless – built to last

07 Utilises local resources and is adapted to local conditions

08 Is produced and maintained through partnerships founded on transparent collaboration across borders and disciplines

09 Employs concepts that are scalable and used globally

10 Profits people, business and the environment

OUR INVITATION

We, the Nordic building sector, invite the Nordic governments and public authorities, investors and financial institutions, end-users and building owners, the energy sector and all others who have a stake in our mission, to join us in our efforts to accelerate the transition to a sustainable built environment

Signed by:

Company name	Company representative	Date	Signature

norden

Nordic Innovation