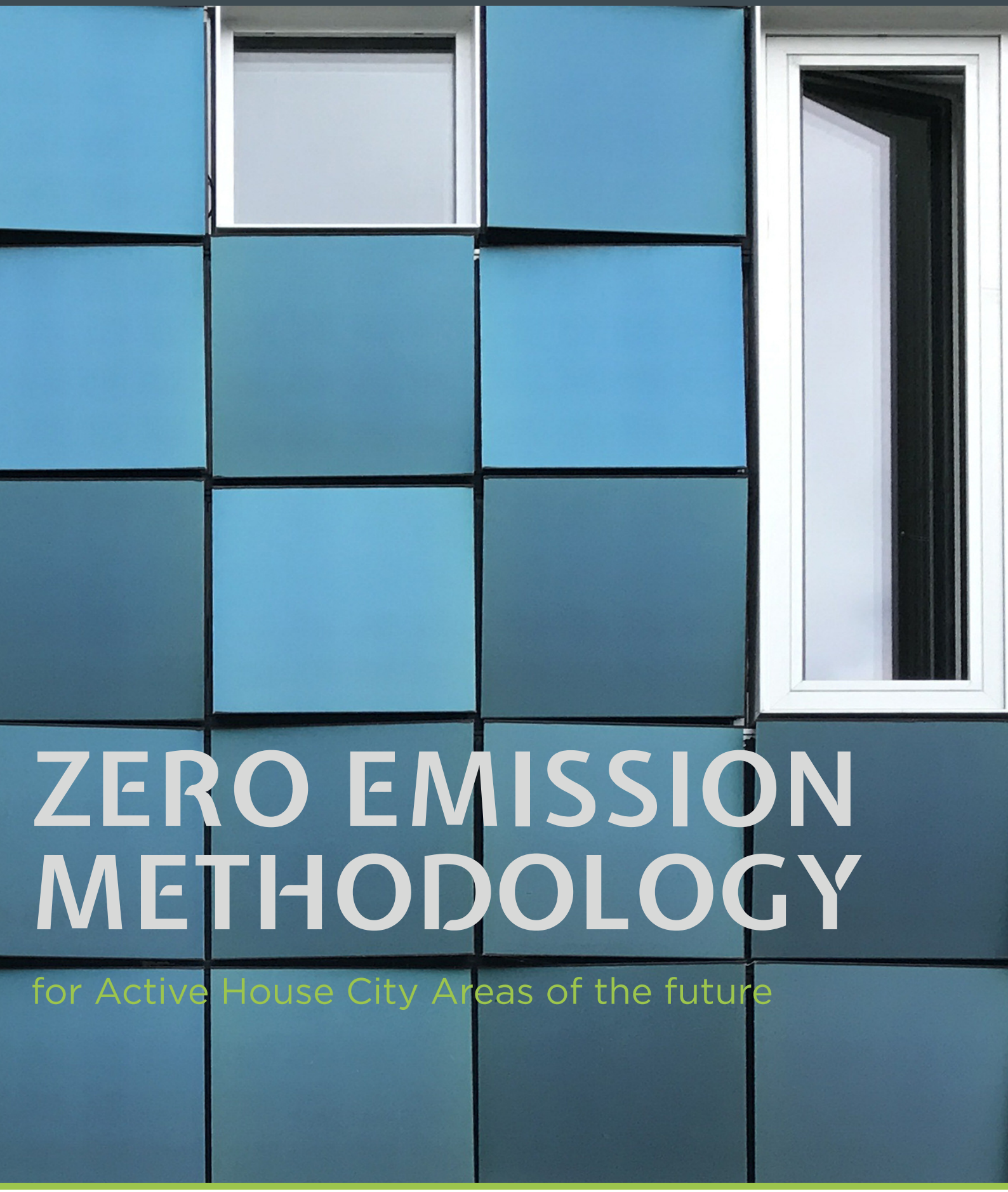


ZERO EMISSION METHODOLOGY

for Active House City Areas of the future

norden Nordic Innovation
NORDIC BUILT
eUDP
CENERGIA
part of KUBEN MANAGEMENT
European Green Cities

ZERO EMISSION METHODOLOGY FOR ACTIVE HOUSE CITY AREAS OF THE FUTURE

13th Conference on **Advanced Building Skins**
1-2 October 2018, Bern, Switzerland

IMPLEMENTATION OF 100% ZERO ENERGY BUILDING STANDARDS

How is it possible to obtain a common standard for energy efficient buildings, which both aims high for new buildings, and can also be used on existing buildings.

The best source for this discussion is the EU-Building Directive and the connected "Nearly Zero Energy Building" standard.

For new building projects, in many cases, it is possible to establish a 100% zero energy building standard. Even though it is demanding with respect to optimising the architecture, it is possible with the help of new types of energy producing facades and roofing materials.

For renovation projects, similar solutions will in many cases also be possible, especially if you are dealing with significant renovation involving the updating of roofs and facades.

THE INTERNATIONAL ACTIVE HOUSE STANDARD

If the above-mentioned policies are to be implemented in the best way, then it is an obvious choice to combine these with use of the international "Active House" standard. This has a combined focus on energy, comfort and sustainability, based on 3 criteria for each of these areas, and with possible use both for new buildings as well as renovation projects.

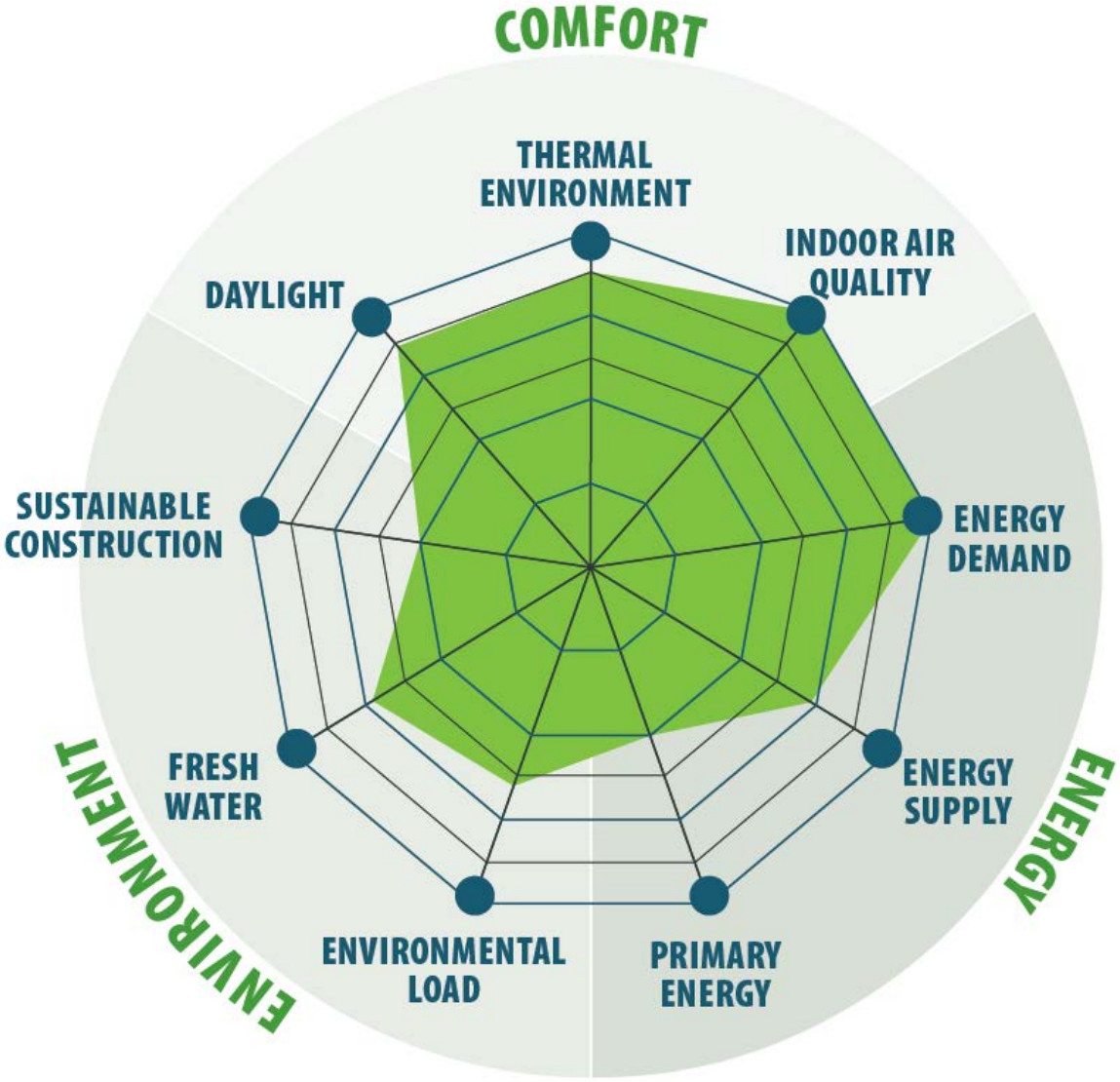
Before a building can get the official Active House label, the Active House standard demands that all parameters are evaluated and verified. See also www.activehouse.info and www.aktivhusdanmark.dk, where the benefits of working with a global oriented standard is illustrated, with a strong focus on indoor air climate – something which is not handled effectively in the EU building directive.

It could be suggested to adapt the Active House Standard to include a focus on user satisfaction and performance in practice, as well as different levels of zero emission standards using renewable energy.

And what could really have a large impact is the development of a methodology concerning how to organise such a standard, not only for one building but for whole city quarters as part of a Smart City and Smart Grid development.

In connection to the Nordic Built Active Roofs and Facades project (www.activehouseroofsandfacades.com) example projects with BiPV and Active House labelling has been documented. These are also possible to find in the European Green Cities database in English (www.bæredygtigebygninger.dk)

ACTIVE HOUSE RADAR FOR COPENHAGEN INTERNATIONAL SCHOOL



USING DIFFERENT LEVELS OF ZERO ENERGY BUILDINGS AS A DRIVER FOR PRACTICAL IMPLEMENTATION OF BUILDING INTEGRATED PV SOLUTIONS (BIPV)

Here it is suggested to use f.ex. prosumer level 1,2,3, and 4, to show how much your building measures up to the zero energy building standard alongside the general energy quality of the building.

RESULTS	
Comfort	
1.1 Daylight:	5.1%
1.2 Thermal environment:	Better level
1.3 Indoor air quality:	≤ 500 ppm
Energy	
2.1 Energy:	30.1 kWh/m²
2.2 Energy supply:	21.7 kWh/m²
2.3 Primary energy:	14.9 kWh/m²
Environment	
3.1 Environmental loads:	Good level
3.2 Freshwater:	28% savings
3.3 Sustainable construction:	Good level

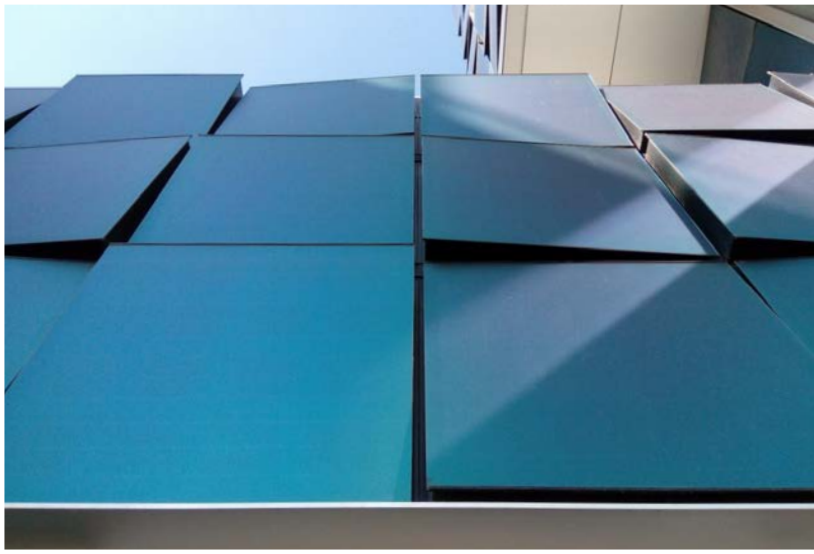
COPENHAGEN INTERNATIONAL SCHOOL, CIS

Copenhagen International School, CIS in Nordhavn, Copenhagen has the largest building integrated PV installation in Europe, covering all façades above ground level helping it to generate 50% of its yearly electricity from solar energy. Cenergia which is now part of

Kuben Management has made Active House labelling and combined this with the implementation of an online Active House Radar. See this at: http://labs.leapcraft.dk/cis/.

CIS is a good example of the Prosumer building of the future. It has BIPV on all facades and is also an aesthetically pleasing piece of architecture due to the specially designed PV panels. With around 39% of the total electricity use (inclusive el-apparatus) produced by the PV modules, CIS is a good example of an almost zero energy building.

The randomised tilt of the PV panels on the facades of CIS. The PV modules were produced by SolarLab as 60 W green chromatic coated hardened glass panels 700mm x 716mm, with 16 monocrystalline PV cells (6") and bypass diode. Each group of 8 panels is coupled to a micro inverter which is easily accessible through the ceiling of the rooms. Architectural design was by C.F.Møller Architects.



THE ACTIVE HOUSE ALLIANCE

IN DETAILS

The **Alliance** was established in 2011, following a roundtable in 2009 which set a first vision for the Alliance and several processes which put the spotlight on the acceleration of climate change and the need to use resources more carefully.

Today the Alliance is a global partnership of more than 40 knowledge institutions, designers, engineers, industries and developers. The members have tested the Active House principles and specifications in full-scale demonstration projects, more than 75 in 20 countries from 2009 to 2018, and established an Active House label in 2016 for the broad market on housing and smaller buildings.
There are 6 national alliances, multiplying the membership into a global community of partners who aim to scale sustainable cities.

82 ACTIVE HOUSES
IN **20** COUNTRIES
38 MONITORED
17 WITH LABEL

AUSTRIA
BELARUS
BELGIUM
BULGARIA
CANADA
CHINA
DENMARK
GERMANY
HUNGARY
ITALY
LITHUANIA
MALAYSIA
NORWAY
POLAND
PORTUGAL
RUSSIA
THE NETHERLANDS
UKRAINE
UNITED KINGDOM
USA

ACTIVE HOUSE MEMBERS:

KNOWLEDGE CENTER:

PARTNER ORGANISATIONS:

NATIONAL ALLIANCES:

secretariat@activehouse.info www.activehouse.info

ATES GROUNDWATER COOLING AND HEATING

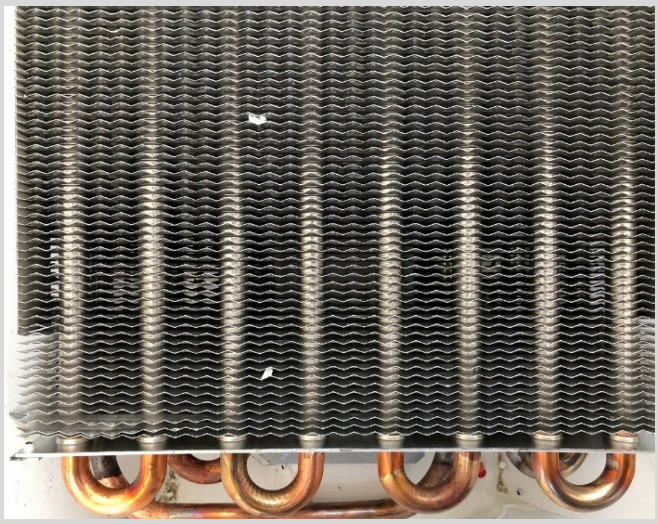
The Bisperberg Hospital in Copenhagen uses Aquifer Thermal Energy Storage or ATES groundwater based cooling as a cheaper alternative than district cooling from HOFOR, the Copenhagen Energy Company.

The yearly energy saving is 75% and more than 90% of heat stored during the summer can be recovered. 2 stage heat pumps from Sabroe are used. In winter, district heating is base load and heat pumps deliver the peaks. (Only from November to March).

In Denmark it has been proven that ATES systems can be used in close proximity to drinking water pumping stations, but it is a requirement that the ground water temperatures are never heated by more than 0.5°C in the vicinity.

Two important positives – there has never been any net consumption of water, and there is no noise from the system, compared to normal compressor cooling systems, which have a clear noise problem from the condenser in the roofs during the summer.

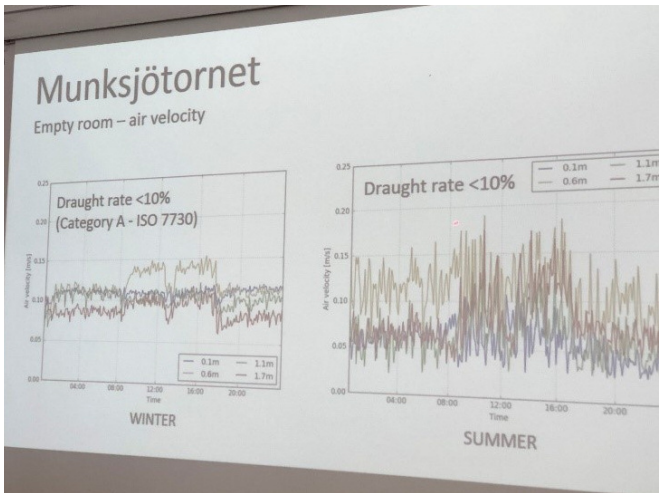
From the ATES system developer Enopsol's point of view, the new and innovative SOLUS heating/cooling system, from Lindab with 19°-24°C operation temperatures, is really interesting. This means a large part of the heat pump operation, with its quite high electricity use, can be avoided, if the ground water temperatures can be raised somewhat in summer periods, and still with a thermal balance over 1 year.

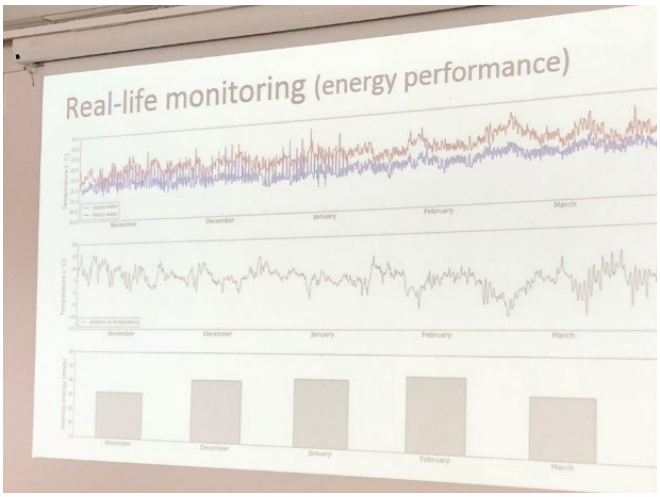


The very efficient Solus heat exchanger from Lindab

Munksjøtårn in Jønkjøbing, Sweden was used for a full scale demonstration

Solus beams in Munksjøtårn

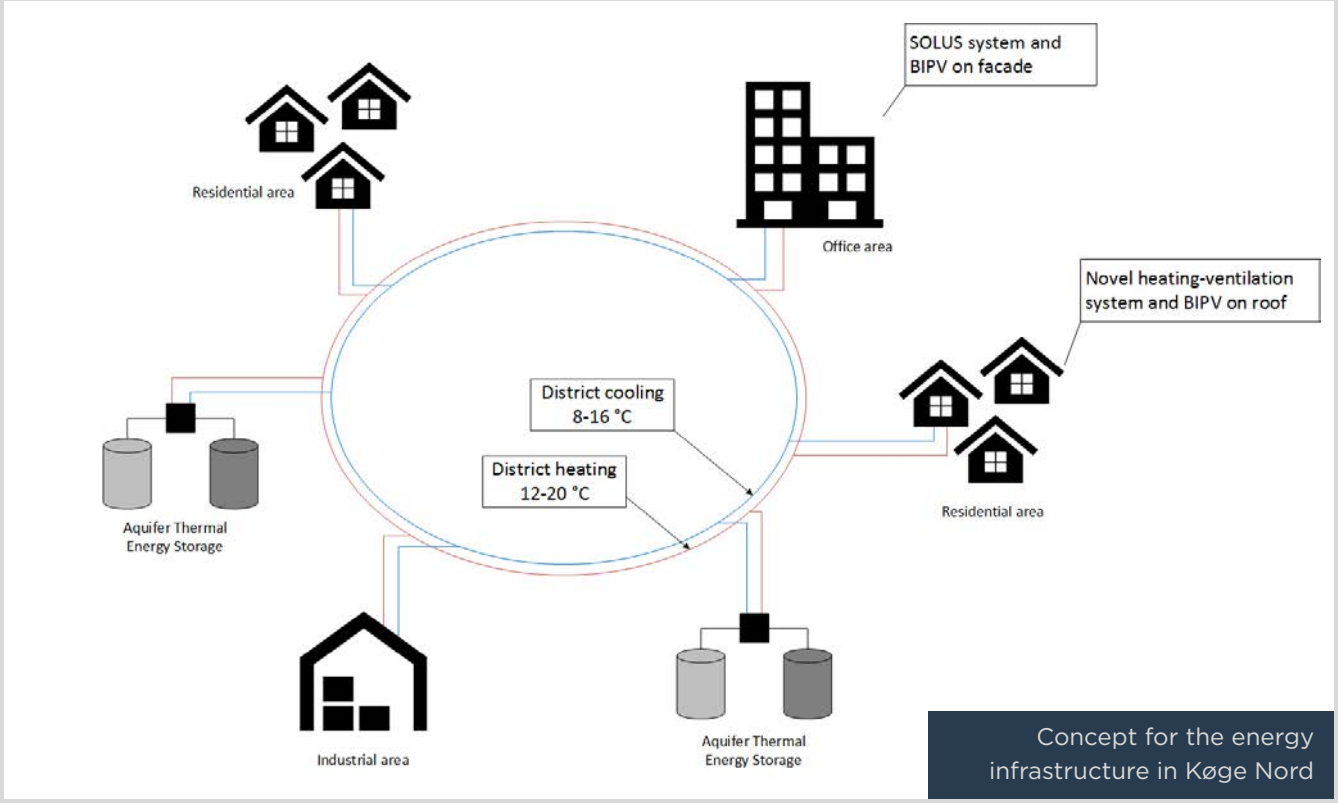




Solus measurements by SBi/Aalborg University confirms good operation in practice

Masterplan of Køge Nord in Denmark, south of Copenhagen. Here a new railway station along the motorway is the base of new city development

For a new city development area, Køge Nord, south of Copenhagen it has been agreed to implement an advanced low temperature bidirectional district heating solution, which can be ideally combined with the above mentioned technologies, and new types of BIPV facades for a large commercial building development area.



Concept for the energy infrastructure in Køge Nord

REALISATION OF BIPV DEMOSITE AT THE TECHNOLOGICAL INSTITUTE IN TÅSTRUP

BiPV companies in Denmark have exhibited their building integrated PV solutions at a common demonstration area at the Technical Institute in Tåstrup near Copenhagen. This includes: Komproment, Solarpartner, Solar Elements, Solar Lab, Ennogie, Danish Solar Energy, Racell, Solar Opti and Solar Tag.

New BIPV technology from Danish Solar Energy, with light grey panels in the middle and with Rock panel façade, was demonstrated by Solarplan, showing PV production quite near normal crystalline PV modules

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