

Zero Emission Methodology for Active House City Areas of the future

Implementation of 100% zero energy building standards

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

The best background of this discussion is the EU-Building Directive and the connected “Nearly Zero Energy Building” standard.

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

If the aim is 100 % zero energy building, then this is more easy to obtain for less compact buildings with only few storeys, because the amount of building surfaces are higher, e.g. to be used for solar electricity production. And more optimised concepts can be obtained, when you are not only dealing with one building, but instead are aiming at optimising renewable energy production for whole city areas, where the best surfaces can be utilised including local infrastructure.

At the same time 100%, zero energy building is easier to obtain for housing than for public or commercial building since the household electricity use is here not included in the energy calculation of a building. From an economic point of view it can here be preferable to handle the whole electricity use for a complete housing estate with several buildings as one consumer based on one electricity purchase meter if e.g. the involved housing association can handle the individual electricity billing based on sub meters for individual apartments. In this case, also household electricity use is included.

For renovation projects similar solutions will in many cases also be possible, if you are dealing with deep renovation, where the renovation also includes exchange of roofs and facades. For more distributed low rise housing areas, this model will however need an improved way of handling the actual electricity production and consumption metering by a kind of virtual metering concept to ensure more reasonable extra metering costs. A solution which Danish authorities in principle has agreed as useful to implement in practice.

Integrated use of solar PV

The impressive price reductions, which have been seen for the global market for PV, has together with the development of new innovations for integration of PV panels, lead to the creation of a number of very interesting example projects, like e.g. the new Copenhagen International School, which was established in the northern harbour of Copenhagen in 2017, and where all facades of the building is equipped with PV panels based on an overall good architectural quality, hereby covering 50% of the yearly electricity use of the school. This is quite similar to the use of district heating, which is also at present based on a 50% renewable energy contribution in Copenhagen.

This is a good example of the fact, that it is not always possible to obtain a 100% zero energy building design.

Besides this, the most important barrier to obtain 100% zero energy building is that it is in practice difficult to get a good correlation between solar energy production and electricity demand, even though new types of battery installations can be of help, and also increased use of electricity based heating solutions like heat pumps and use of local thermal storages.

Different levels of zero energy building as a driver for practical implementation of building integrated PV solutions

If it becomes possible in cooperation with specialist organisations like the Danish Building Research Institute SBI to agree on a number of official levels of zero energy building (e.g. 30%, 50%, 80% and 100%), then this could be a real benefit e.g. for Danish municipalities. By help of this, they could be allowed to utilise such future oriented building standards without coming in conflict with existing legislation concerning demands to establish special electricity producing companies, when they want to utilise PV in connection to new build or renovation of existing buildings.

Actually the first zero energy house was established in Denmark as a full-scale test house already in 1973 in perfect timing to the global energy crisis, which emerged at the same time. In this way it also logical, that the stakeholders in Denmark try to be in front in this area today.

The international Active House Standard

If the mentioned policies shall be implemented in practice in the best way, then it will be 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 building as well as renovation.

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, especially with a very strong focus on indoor air climate, something which is not handled in a clear way in the EU building directive.

It can be suggested to utilise and adapt the Active House Standard, so it also include a focus on user satisfaction and performance documentation in practice, at the same time as different levels of zero emission standards by help of renewable energy is included.

And what would really have a large impact would be 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.

During autumn 2017 and spring 2018, there are plans to improve the best practice Danish database www.baeredygtigebygninger.dk from European Green Cities and The Danish Association of Sustainable Cities and Buildings, FBBB, so it will function as a Nordic best practice database including a number of Almost Zero Emission Active House labelled building projects. Here it is aimed to also include a number of city area example projects as well.

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Results from Nordic Built projects

- Active Roofs and Facades in Sustainable Renovation
- Living in Light

Nordic Sustainable Buildings database

Developed from www.baeredygtigebygninger.dk

International Active House Labelling – standard

(www.activehouse.info)

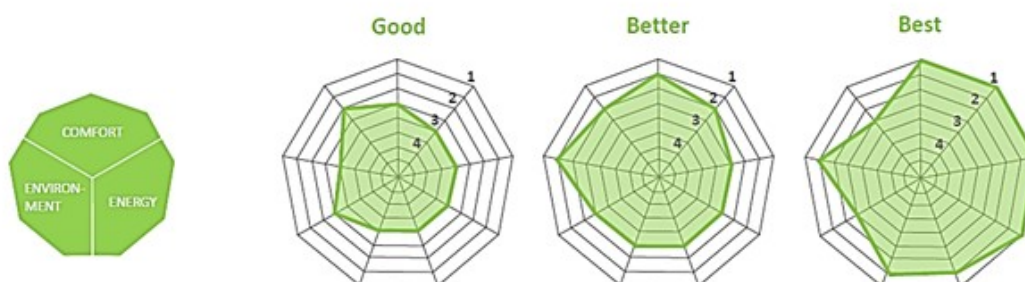
- Energy
- Comfort
- Sustainability

Introduction of Methodology for:

Zero Emission City Areas

Zero Emission Buildings

- in different levels



“Active House Label is a worldwide quality stamp for comfortable and sustainable buildings. It advises on elements that are important to humans life and living in their home”

The level of ambition how “active” the building has become can be quantified into four levels, where 1 is the highest level and 4 is the lowest.

The Active House label can be issued to buildings that has been evaluated in accordance with the Active House specifications and meet the minimum demands for indoor comfort, energy efficiency and environment.