EC-LINK 中欧生态城

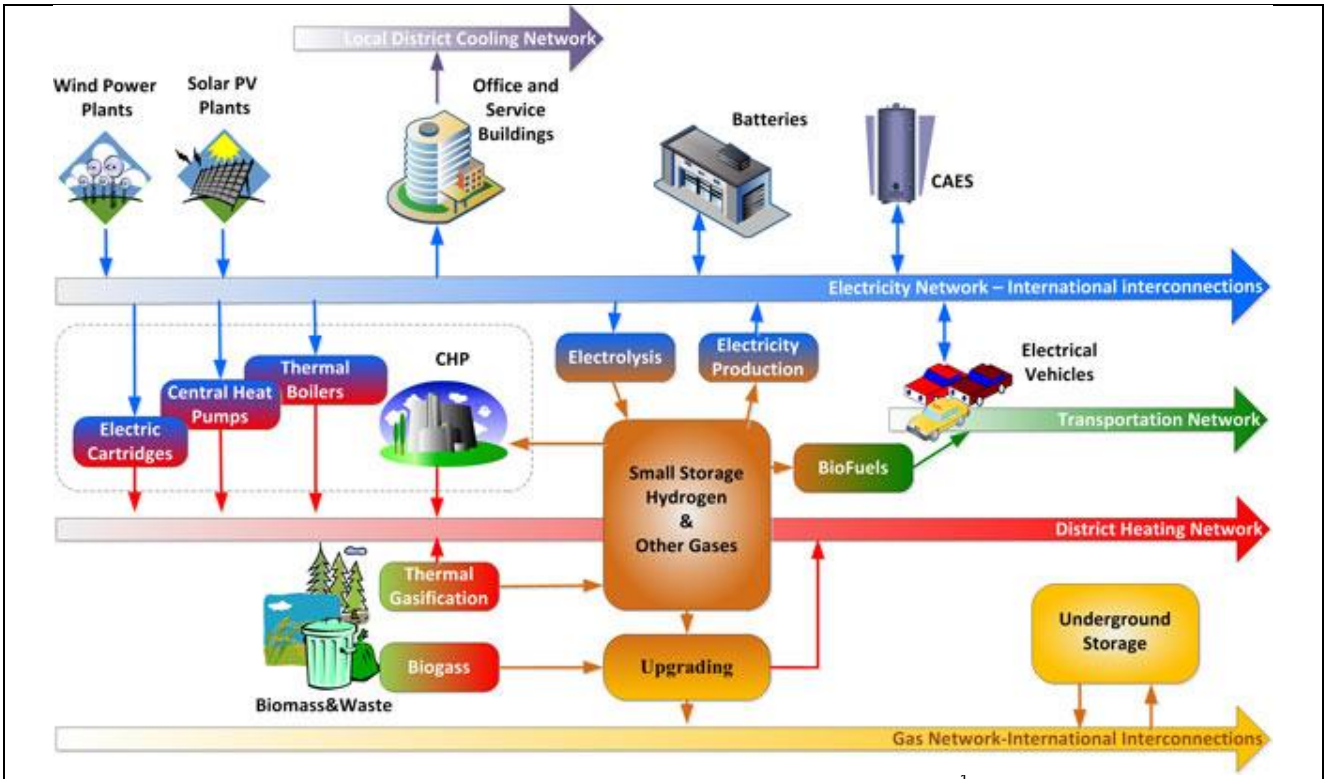
Europe-China Eco-Cities Link
中欧低碳生态城市合作项目

# A Collection of Primary Tools


## Tool GB 2: Active Building Design.

**What this tool does:**

The Active House (in German ¨Aktivhaus¨) is a zero-net energy (ZNE) building. It is characterized by its zero net energy consumption. Through renewable energy sources within the building or on site, the ZNE house creates enough energy during the year to cover its total energy consumption. As such this is an active house that generates its own energy, or even an excess of energy, and it contributes to a reduction in green-house-gas (GHG) emissions. However, at times, the Active House may need energy from non-renewable fossil sources, while at other times it may have excess energy and may be able to power electric vehicles or sell excess electricity to the grid. The overall balance, however, may turn out to be net-zero. Buildings which produce surplus energy are sometimes also called ¨energy-plus buildings¨, or ¨near zero energy buildings¨, or ¨ultra-low energy houses¨.




Energy saving option in Builiding desgn and construction[1]

"The Active House … combines energy efficiency with specific attention to user health and comfort, indoor climate and the environment. Active House focus on Comfort, Energy and Environment, and require a holistic view. An Active House is evaluated on the combination and integration of the three main principles of Comfort, Energy and Environment. The evaluation has to be done in accordance with the Active House specifications and the performance are described through the Active House Radar showing the level of ambition of each of the three main Active House principles and their nine sub-parameters.

The integration of each parameter describes the level of ambition of the building. For a building to be considered as an Active House, the level of ambition can be quantified into four levels, with 1 as the highest and 4 the lowest.

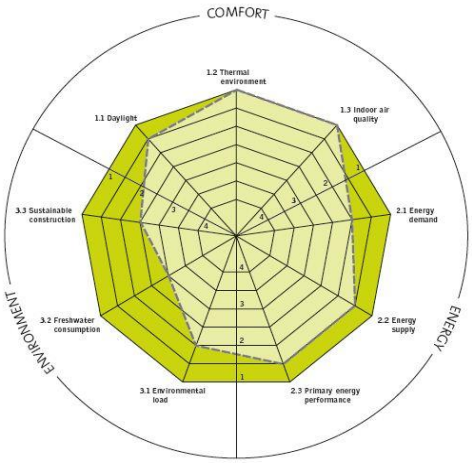
The building must be evaluated and benchmarked on the nine sub parameters, (Daylight, Thermal Comfort, Air quality, Energy demand, Energy supply, Primary Energy, Environmental load, Freshwater, Sustainability) where each of them is evaluated in accordance with international standards, like EN 15251, ISO14040 as well as national standards and methodologies for i.e. energy demand. Some of the parameters are included in building legislation and in this sense, the methodology used on national level can be reference." [Eriksen, K. E. 2017]

Like the Passive House, the Active House is also considered to contribute significantly to the lowering of carbon emissions, and the dependence on fossil fuels. Despite their initial higher investment costs, Active Houses are expected to gain bigger market shares with the expected decrease of decentralized technologies for generation of renewable energy, i.e. photovoltaic devices, wind energy devices, heat exchange pumps, and energy efficient lightning and home appliances including heating, ventilation and air conditioning (HVAC). Active Houses can be part of smart grids, thus contributing to the integration of renewable energy sources and integration of plug-in electric vehicles. The net-zero concept may also be extended to cover water and waste aspects of the house, and through storage devices also to disaster resilience.

## How does it work?

**Twelve Steps to Affordable Zero Energy Construction**[2]

1. Design for Zero Net (integrate building design with energy concept).
2. Use Energy Modeling for the most cost-effective zero energy building.
3. Super-seal the building envelope
4. Super-insulate the building envelope
5. Minimize thermal bridging
6. Use highly insulated windows and doors
7. Use the sun for passive solar gain
8. Use the sun for electricity and hot water
9. Create an energy-efficient, fresh air supply and manage humidity
10. Use an energy-efficient heating and cooling system
11. Install energy-efficient lighting
12. Select energy-efficient appliances and electronics




https://www.activehouse.info/wp-content/uploads/2016/07/Active-House-Radar.jpg

### Credentials;

Tool GB 2: Active Energetic Building Design.

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## Literature / further information:


- Drury Crawley, Shanti Pless, Paul Torcellini. 2009. Getting to net zero. *ASHRAE Journal* 51(9): 18–25. ASHRAE.
- Eriksen, K. E. 2017. Active House Label – a tool to empower house owners and developers to design sustainable buildings. *Linkedin*. 3 July. https://www.linkedin.com/pulse/active-house-label-tool-empower-owners-developers-design-eriksen
- Cheng, R. 2014. *Integration at its Finest: Success in High-Performance Building Design and Project Delivery in the Federal Sector*. Office of Federal High-Performance Green Buildings, U.S. General Services Administration
- Johnston, D., Scott Gibson, S. 2010. *Toward a Zero Energy Home: A Complete Guide to energy self-sufficiency at home*. Newtown, CT: Taunton Press, 2010.
- Voss, K. Mussal, E. 2012. *Net Zero Energy Buildings.* Detail Publishers.
- Maclay, W. 2014. *Net Zero Energy Houses – Leading-Edge Design and Construction of Homes and Buildings for a Renewable Energy Future*. Chelsea Green Publishing. Chelsea (Vermont, USA).
- Mereson, J. and Offut, J. Zero Energy Home Design. *http://www.zerohomes.org/zero-energy-home-design/*


# Notes

[1] http://www.et.aau.dk/digitalAssets/103/103640_iesan--2--650px.jpg

[2] For more details refer to: http://www.zerohomes.org/twelve-steps-to-zero/