

Zero Energy Design

Myoungju Lee^{}, Eungshin Lee*

1 Myoungju Lee (College of Architecture, Myongji University, Yongin City, Korea)

2 Eungshin Lee (IT& Zero Energy Architecture Center, Myongji University, Yongin City, Korea)

**Presenting & Corresponding Author: Myoungju Lee (mylovezed@gmail.com)*

The global aim is to be carbon-neutral (climate-neutral) by 2050 as establishing their policies and public-action plans. South Korea also announced its carbon-neutrality by 2050 according to the global trend. We might think there is enough time for us. However, it is very urgent, and we are running out of time even if we practice it very strictly to reduce the carbon emission, because the global warming is accelerating with the weather anomaly increasing in the temperature of the earth's surface.

Especially, buildings should be planned and built as zero energy because once they are built, they last nearly 30 years. To plan zero energy buildings, it needs the zero energy design which has two aspects. First, literally the perspective of designs should be also considered even though it's called zero energy buildings. Second, along with the structure, function and beauty of buildings, we should also design energy saving techniques, application of high-efficiency equipment, renewable energy techniques and ICT technologies to achieve the zero energy goals.

Nowon Zero Energy Housing Complex (Nowon EZ House) is the first zero energy housing complex in Korea. IT & Zero Energy Architecture Center at Myongji University has been supported by Nowon District and Korea District Heating Corp. (KDHC) and has monitored Nowon EZ House's thermal energy and electrical energy separately since 2018. As a result of measuring the consumption of heating energy so far, it has been reduced by half comparing to existing buildings. However, the amount of domestic hot water consumption did not show the big savings as it highly depends on the residents' living style. Another benefit of Nowon EZ House maintains a constant indoor temperature and humidity through the year which provide comfort living experience to its residents. It has lower temperature and humidity over summer and higher over winter than other non-zero energy housings. The renewable energy ratio (RER, in Korean, renewable energy self-supporting ratio) is over 92% per year.

In 21st century, we should have zero energy design which includes structure, function, beauty and energy of buildings to adapt to the climate crisis and reduce greenhouse gases. Zero energy design should be applied not only to the buildings but also to the community and be extended to the zero energy city.