Decarbonisation of construction industry

Jerzy Ptaszyński

Research and Market Service Director

AMRON CENTRE ANALYSIS

July 18, 2023

Beginning of the 21. century is a time when the actual scale of the impact of industrial civilization and consumerism on the environment and its potential influence on the planet slowly began to reach the awareness of the societies. The threat of a climate catastrophe caused by greenhouse gas emissions, the imbalance of ecosystems, overproduction of waste and the perspective of depleting fossil fuel resources have prompted not only scientists, but also politicians and professionals from various fields to search for some new solutions.

Construction sector is one of those areas of human activity that to a greater extent contribute to the degradation of the environment. It is estimated that nearly 40% of global greenhouse gas emissions are the result of its activity. Only in 2020 it was responsible for emitting approximately 20 billion tons of carbon dioxide into the atmosphere, and this figure includes both emissions related to the use of buildings, as well as emissions related to the construction process including production and transportation of building materials.

So called operational carbon footprint (associated with the use of buildings) is about 2/3 of the entire carbon footprint of a building, and its size results from the demand for energy used primarily for heating, ventilation, air conditioning and lighting. The embedded carbon footprint (derived from the building process and used materials) makes up remaining 30-40% of the building's total carbon footprint. While the energy efficiency of buildings continues to improve, overall building-related emissions continue to rise. In case of operational carbon footprint, this is due to the constant increase in demand for new facilities, while in case of the built-in carbon footprint, it is mainly due to the fact that new facilities are equipped with more and more advanced technologies and devices, which production is highly emission-intensive. If we take into account the forecasts, according to which the world's building stock may double by 2050, the scale of the problem seems giant. It is optimistic however, that the decarbonisation of the construction sector is considered by experts as one of the most promising and potentially effective methods of slowing down and mitigating the upcoming climate change. Reducing the carbon footprint of a building can be achieved even by relatively simple methods, such as:

- optimisation of the design, including, above all, the size of the planned building (mainly in case of single-family housing);
- choosing proper building materials and optimising their use - materials with a low carbon footprint are natural, such as wood (provided they come from sources that guarantee responsible forest management), stone, as well as recycled and recyclable materials. On the other hand, materials with a high carbon footprint are cement, which production is responsible for 8% of global CO2 emissions, as well as steel or aluminium;
- limiting the transport of building materials - using locally available materials and appropriate logistics planning;
- using the energy from renewable sources both in the production of building materials and in the construction process.

The Paris Agreement of 2015, signed also by Poland, obliges us to achieve net zero global greenhouse gas emissions in 2050. The goal set for the construction sector for 2050 is a zero operational carbon footprint for all buildings. For new and modernised buildings, it is to be a zero net carbon footprint throughout the life cycle, i.e. a zero balance of both built-in and operational carbon footprints. Starting from 2030, the calculation of the carbon footprint throughout the life cycle of all newly constructed buildings is to be the responsibility of architects. From 2027, however, this obligation will apply to buildings with floor area exceeding 2 000 sqm. Upcoming years may therefore bring a certain revolution in architecture and construction.

An example of such a revolutionary project is the "Stockholm Wood City" being currently developed on an area of 25 ha in the Stockholm district of Sickla. It is intended to be the world's first modern complex of buildings, including apartment buildings, service outlets and office space built of wood. The building material itself is produced in a modern technology called Mass Timber that is a material of exceptional strength, fireproof and, obviously, with a much lower carbon footprint than concrete and steel. The originator and investor of the project is the development company Atrium Ljungberg. The assumption is that all buildings are to be energy self-sufficient, thanks to the systems of obtaining, storing and releasing energy. The project involves construction of buildings with large glazing, especially on the south side, to ensure natural light and the possibility of heat recovery from sunlight during the winter months. The roofs are to be covered with dense, varied greenery as part of regulating the temperature inside and restoring ecosystems, largely degraded by construction in general.

źródło: Atrium Ljungberg (https://www.al.se/en/sickla)

In terms of urban planning, the estate will fit into the assumptions of the so-called “five-minute city”, according to which residents will be able to reach home, work or numerous service outlets, including cafes and restaurants, on foot or by bike, within five minutes.

It is certainly difficult to expect a direct transfer of similar patterns to Poland. What we can use, however, is primarily experience in the areas of legislation and organisation of construction decarbonisation in countries, where this process is already more advanced, especially considering that the time for its implementation is getting shorter and shorter. One of the most important issues, however, still seems to be the building awareness among all the participants of the construction process - investors, architects, contractors, as well as manufacturers of building materials and property managers, as well as, perhaps most importantly - final recipients, i.e. buyers and tenants of buildings.

JERZY PTASZYŃSKI
Research and Market Service Director
e-mail: jerzy.ptaszynski@amron.pl

AMRON Centre

AMRON Centre is a professional analytical and research center, specializing in issues relating to the real estate market analysis and monitoring. Since over 10 years we provide our clients and partners with reliable information on real estate market, we explain phenomena recorded on that market and we assure the access to dependable economic information. Our expertise and experience covers assessing the influence of transaction prices changes on Polish housing market perspectives – as the only market researches provider, we analyze changes on housing loans market, due to access to the data gathered in System for Analysis of Real Estate Financing Market (SARFiN System). Unlike publications of other housing market consulting companies, our reports express the actual picture of the market, based on transaction prices. We guarantee comprehensive approach to the real estate market issues, including the complex analyses of micro- and macroeconomic factors and long-term perspective grounded on historic data, current market prices and prognoses.