



Expert analysis
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BIM, a lever to improve the carbon footprint of buildings

*Analysis with Matthieu Ferrua,
Director of the ENGIE Solutions BIM Factory*

After getting off to a late start, digitisation of the construction sector has seen very rapid acceleration in recent years with the widespread use of Building Information Modelling (BIM).

More than a technology, it is a working method based on the sharing of reliable information throughout the lifespan of a building or infrastructure, using a 3D digital model.

Among the many advantages it offers, BIM should allow the carbon footprint of buildings to be reduced and encourage energy renovation. Matthieu Ferrua, director of the ENGIE Solutions BIM Factory, provides an update on these issues.



Could you remind us what BIM really is?

BIM is a 3D modelling technology that incorporates data across the entire life cycle of a building, from design through construction, operation and maintenance to demolition.

After emerging as a concept in the 70s and 80s, BIM took off in the 2000s in the field of industrial construction and through some innovative architects like Frank Gehry, to facilitate the creation of complex architectural forms. This type of modelling already existed in the aeronautics and automotive industries, but came late to the construction sector, where it has gradually become more widely used since the mid-2010s.

The main advantage of BIM is that it makes it possible to coordinate data from the different trades working on the same building, whether it is architecture, plumbing, HVAC engineering, electricity, or whatever.

The idea behind “BIM Management” is to ensure that all the data, plans and information are consistent, well ordered and shared as early as possible. Pooling these resources makes it possible to anticipate problems, and better visualise structures and get to grips with them.

For the construction industry, BIM is the gateway to the digital age. There is some catching up to be done because, compared with other industrial sectors, the world of construction has changed little since the 1950s. In fact, BIM is an enormous asset in improving the speed, quality and modularity of building. It is also a key component of the digital twins of the future. We are only just starting to see the benefits.

How can BIM improve the carbon footprint of a building?

BIM is a great tool for calculating the carbon footprint of a project.

In practical terms, BIM allows modelling of “BIM objects”, such as a socket, a valve or a section of wall, that include data about the object, in particular the amount of carbon associated with it.

At ENGIE Solutions, we have started using this technique, through the VALOBIM® offer, to optimise the potential for reuse of existing building components and to enrich circular economy ecosystems.

Before the demolition phase, a diagnosis of resources is carried out and integrated into a BIM model, allowing us to produce an exhaustive report including a measurement of the carbon footprint of each object/resource so that it can be used in the best way: reuse, recycling, or energy recovery by incineration. This localised and quantified qualification of components lets us develop reuse scenarios and optimise the total carbon footprint of the project. For the ENGIE Campus project, for example, savings of 41 tonnes of CO₂, i.e. 304 round trips between Paris and New York, were identified for part of the demolition phase, and more than 7372 tonnes of potential savings on the future project, i.e. 28,424 round trips between Paris and London by air.

We also use this technology during the design phase of structures, to quickly and precisely determine the carbon savings linked to the choice of components (low-carbon concrete rather than conventional concrete, for example). In other words, BIM helps us identify potential sources of carbon savings and hence make the most appropriate choices from an economic and environmental point of view.

This is all still very recent. We are currently working with SERCE¹ on incorporating this carbon data throughout the BIM chain. Should we calculate the carbon content of the component as sold by the supplier, or should its transport be taken into account? What about the way it is used, its life cycle and its recycling potential? All questions that deserve a harmonised response from the various players in the building sector.

¹ SERCE - Companies for the energy and digital transition – www.serce.fr
(Union of electrical and climate engineering companies - formerly the Union of electrical construction network companies)

What about energy renovation?

This is another advantage that the BIM model offers for the energy transition of buildings. It allows very precise measurement of the heat balance of an existing or planned building, using dynamic thermal calculations fed by the model. By including them in the 3D model, we can easily identify the work that will lead to the best improvement in a building's energy performance. For example, it might be identifying a thermal weak spot, or a room where the insulation is poorly distributed.

This method of energy optimisation is still in the research and development stage. So far, we have tested it on the ENGIE Solutions services buildings, and the results are promising. The development of this technology on a large scale will have to take into account the constraints and specifics of each building and the new thermal regulations. BIM is opening up great prospects for the future of energy renovation!

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About ENGIE Solutions

ENGIE Solutions supports cities, industries and companies in the tertiary sector, providing them with solutions to the challenges posed by the energy transition in the form of turnkey and bespoke packages.

ENGIE Solutions' experts apply all their expertise in pursuit of three aims: optimising the use of energy and resources, greening energies and reinventing living and working environments.

ENGIE Solutions guarantees its clients a single point of contact and a combination of complementary offerings that go beyond energy. The company is committed to achieving results and its 50,000 employees which operate throughout France (900 sites) have expertise in an extremely diverse number of areas, ranging from the design and operation of infrastructure and services, to funding, installation and maintenance.

ENGIE Solutions is part of the ENGIE Group, one of the world's leading low-carbon energy and services groups whose purpose is to act to accelerate the transition towards a carbon-neutral world.

Turnover: €10 billion To find out more: <https://www.engie-solutions.com/en>

