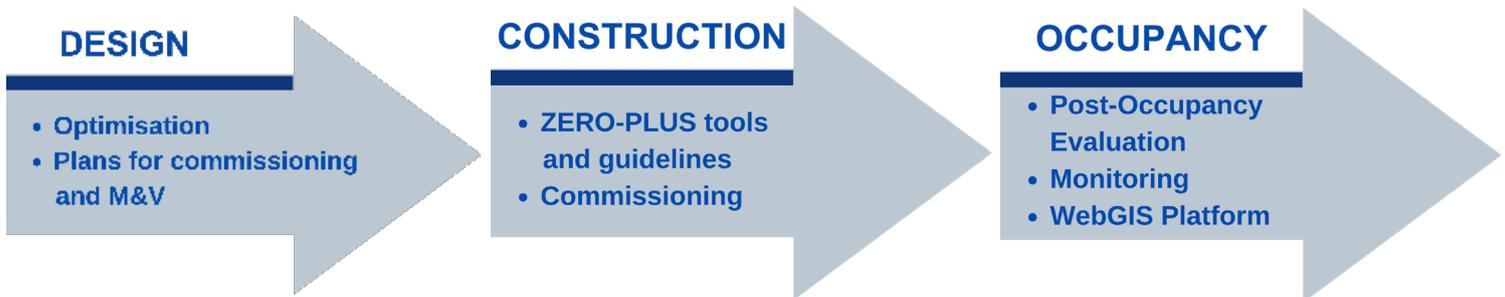


Achieving near Zero and Positive Energy Settlements in Europe using Advanced Energy Technology

The **ZERO-PLUS** Project has developed a set of innovative solutions that could form the basis of a commercial service supporting the design, construction, commissioning and monitoring of Net Zero Energy Settlements (NZES). Together, these solutions form the ZERO-PLUS concept. Unlike other tools in the market that support the construction of energy efficient buildings, ZERO-PLUS focuses on the settlement level and on integrating cost and construction considerations from the outset of settlement design.

As demand for highly energy efficient buildings increases, systemic barriers hinder progress towards a more sustainable building stock. These barriers include, among other issues, the uncoordinated construction supply chain and the lack of clear guidelines on how to build cost-effective net zero-energy dwellings. The **ZERO-PLUS concept** streamlines the design and construction process of highly energy efficient residential settlements by using an integrated, iterative and collaborative approach to design and construction management. Design and construction considerations are supported from the planning stage by involving all stakeholders, including technology suppliers, in a **settlement-level optimisation** method that employs a purpose-built toolkit.



ZERO-PLUS provides an **innovative, cost-effective yet readily implementable** combination of services and tools for designing and building Net Zero Energy residential neighbourhoods that will significantly reduce both their **initial and operational costs**. In addition, ZERO-PLUS will reduce delays and other mishaps during construction.

Benefits of settlement construction with the support of a service based on the ZERO-PLUS concept

- Improved energy performance at the building and settlement level
- Reduced costs of planning, design and construction of Net-Zero Energy Settlements
- Improved comfort for residents of the settlements
- Compliance with national and European legislation with regards to the energy performance of buildings (Energy Performance of Buildings Directive 2018/844)
- Provision of energy load data at the building and settlement level, facilitating maintenance

ZERO-PLUS employs a proven method to support the construction of housing that achieves renewable energy and energy saving targets at the lowest possible cost, with clear information provided on the **trade-off between cost and performance**. In addition, ZERO-PLUS ensures that the necessary information for the maintenance of energy producing and energy saving equipment can be made readily available to the householders and housing providers/developers.

Pictured: ZERO-PLUS pilot project in Derwenthorpe (near York), UK



Potential customers of a service based on the ZERO-PLUS concept

- Growing municipalities aiming for excellence in residential construction;
- Housing associations with environmental commitment, who aim to provide residents with highly energy efficient and low-carbon buildings;
- Private or public housing developers investing in multi-building residential developments who wish to leverage compliance with the EPBD and improve performance and design;
- Professional architecture and engineering practices that are designing or building highly energy efficient residential settlements.

Results of the ZERO-PLUS pilot projects

The benefits of applying the ZERO-PLUS concept are being demonstrated in four pilot projects in different climatic settings. The targets of the ZERO-PLUS pilot projects are:

- 16% cost reduction compared to reference highly efficient buildings
- Net regulated energy consumption of < 20 kWh/m²/year
- Energy production by renewable energy sources of >50 kWh/m²/year

Due to the flexibility of the ZERO-PLUS concept, the targets can be adjusted as needed in each project.

Pilot project	Results for the design stage
United Kingdom - York	<ul style="list-style-type: none">• 17.7% cost reduction• 3-11 kWh/m²/year net regulated energy consumption• 51.7 kWh/m²/year energy production by RES
France - Grenoble	<ul style="list-style-type: none">• 18.4% cost reduction• 16 kWh/m²/year net regulated energy consumption• 55.8 kWh/m²/year energy production by RES
Italy - Bologna	<ul style="list-style-type: none">• 33% cost reduction• 1.5 – 1.6 kWh/m²/year net regulated energy consumption• 60 kWh/m²/year energy production by RES
Cyprus - Nicosia	<ul style="list-style-type: none">• 17% cost reduction• 14.8 kWh/m²/year net regulated energy consumption• 55.4 kWh/m²/year energy production by RES

If one assumes that 20% of the dwellings to be built in Europe by 2040 could be built in settlements implementing the ZERO-PLUS concept, the potential savings on construction costs could reach €70 billion.

Next steps towards commercialisation

The next steps in the development of the ZERO-PLUS concept towards large scale commercial implementation are the preparation of commercial versions of the methodology and tools developed, followed by validation of commercial viability in test cases. Once this has been achieved, due to its flexibility and modularity the ZERO-PLUS concept could easily be scaled-up and replicated in mixed-use, commercial and industrial developments.



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