Achieving near Zero and Positive Energy Settlements in Europe using Advanced Energy Technology
H2020 - 678407

Planning & Implementation of monitoring for the ZERO-PLUS Settlements

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PROMITHEASNET
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The ZERO-PLUS project

Scope: ZERO-PLUS is a comprehensive, cost-effective system for the design, construction and monitoring of Net Zero Energy Settlements that is being tested and implemented in four pilot projects across Europe. Greater energy efficiency and economies of scale are achieved through a transition from single NZE buildings to NZE settlements in which the energy loads and resources are optimally managed.

- **Coordinator**: National and Kapodistrian University of Athens
- **Consortium**: 16 partners from the academia and the industry
- **Funding**: H2020
- **Total budget**: 4,165,502.50 euros
- **Duration**: 60M i.e Oct. 2015- Sep. 2020
- **Website**: [http://www.zeroplus.org/](http://www.zeroplus.org/)
The ZERO-PLUS concept

TARGET

To develop a method and accompanying tools that will provide an overarching solution mitigating the barriers to successful AND COST-EFFECTIVE construction of new residential Net Zero Energy Settlements (NZES).

✓ Net Regulated energy of **0-20 kWh/m²** per year
✓ RES energy production of **50 kWh/m²** energy per year
✓ **16%** reduction of initial costs

ZERO-PLUS building

STRATEGIES

- Increasing the efficiency of the components directly providing the energy conservation and energy generation in the NZE settlement.
- Reducing the costs through efficient production and installation processes.
- Reducing operational costs through better management of the loads and resources on a district scale rather than on the scale of a single building.
The ZERO-PLUS concept

Financial, energy and environmental gaps between cost optimal levels and NZEB levels in Europe, and the ambition of ZERO-PLUS
Benefits of the ZERO-PLUS concept

- NZEBs are expensive
- Uncoordinated construction supply chain
- Unsure how to achieve Net-zero energy performance

Without ZERO-PLUS

With ZERO-PLUS

Optimisation at settlement level reduces cost
Integrated planning and management of supply chain and construction process
Methodology ensuring optimal achievement of NZE performance
Who we are

Case study owners

- CYPRUS, Peyia
- FRANCE, Voreppe
- ITALY, Granarolo dell’ Emilia
- UK, Derwenthorpe

Technology providers

- FAE HCPV
- WindRail
- SolarBlock biPV
- REACT+
- FIBRAN XPS
- freescoo HVAC

Research partners

- Monitoring and Evaluation of the Settlements’ Performance
- Design and Optimisation of Modular Envelope Components
- Energy Production and Management of Individual Buildings
- Integrated Design and Optimization of the NZE Technologies to be implemented at the Settlements Level – Creation of Simulation and Monitoring Protocols
- Market Analysis and Model for Business Growth
- Construction Management, Cost Management and Implementation of the Innovative Technologies
- Integrated Design and Optimization of the Zero Energy Settlements
Four years in the project...

From

FRANCE, Voreppe

ITALY, Granarolo dell’ Emilia

UK, Derwenthorpe

To

FRANCE, Voreppe

ITALY, Granarolo dell’ Emilia

UK, Derwenthorpe
Four years in the project...

But how did we get there?

MRE-light
Voreppe, France - In October 2018, MRE hybrid modules were installed on the roof of an apartment building.

Maximise your roof potential
Four years in the project...

From

To

But how did we get there?
The ZERO-PLUS concept for Near Zero Energy Settlement design and construction

1. DESIGN PHASE
- Simulation of energy technologies and systems
- Assessment of microclimate mitigation
- LCCA

2. CONSTRUCTION PHASE
- Commissioning plan
- Cost control tool
- Change management tool
- M&V protocols and guidelines

3. OCCUPANCY PHASE
- POE protocol
- WebGIS monitoring platform
- Framework for reliability centred maintenance

Toolkit

1.1 Preparatory activities
1.2 Setting objectives and technology scouting
1.3 Building level simulation
1.4 Settlement level simulation
1.5 Initial integrated design (minim. construction costs)
1.6 Optimization of design (LCCA)
1.7 Assembly and installation planning
1.8 Final design; Commissioning and M&V plans

Lessons learned

Construction management

Cost control & change management

Pre-occupancy checks

Functional testing

Inspection and installation of EE, RE and monitoring equipment

Commissioning plan

Lessons learned

Lessons learned
LESIONS LEARNED

Purpose:
To capture the lessons learned from the planning, construction and monitoring for Zero Plus and as a result generate best practices as well as recommendations for similar future projects.

Through questionnaires answered by three main groups of project:
- Case study owners
- Case study support teams
- Technology providers

Opportunity to:

1. Identify success stories, pitfalls and/or unintended outcomes (positive or negative).

2. Recognize things that went well, things that might have been done differently, the causes of pitfalls and suggestions for facing or avoiding those.
The questionnaires were organized in sections related to the project topics and activities.
ZERO PLUS – LESSONS LEARNED

- Best Practices
- Involved experts
- Documents
- Tools
- Difficulties
- Changes
- Processes

Project phases
### Zero Plus – Lessons Learned

#### Best Practices
- Broad team of experts
- Local microclimate assessment, LCA, Environmental considerations in the design, Energy simulations
- Pre-occupancy monitoring
- Post-occupancy evaluation, Continuous monitoring of the building and settlement performance
- Comprehensive monitoring schema
- Welcome Package for occupants

#### Pitfalls
- Restrictions of Local Regulations
- Inexperience of contractors with certain processes/technologies

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These occurred because the concept was implemented for the first time. Therefore they are not limitations, but opportunity to develop relevant guidance for future projects that will implement this concept.
# ZERO PLUS – LESSONS LEARNED

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<th>Lessons</th>
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<tbody>
<tr>
<td>Identify and bring together a team of partners early on (pre-design)</td>
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<td>Establish early collaborations and shared vision among all involved partners/experts</td>
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<td>Study of technology applicability at an early stage (regulatory requirements, site constrains)</td>
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<td>Selection of applicable technologies that can contribute to delivering project targets</td>
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<td>Feasibility analysis in relation to local context</td>
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<td>Continuous management of the design development</td>
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<td>Work-plan: assign responsibilities, define collaborations necessary at each stage, allocate appropriate timeframe for each phase/action, set milestones</td>
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<td>Use of tools that can provide support, highlight risks, and suggest solutions (Commissioning Plan, Risk Registry, Change Management, Cost Management, Construction Milestones, M&amp;V Plan)</td>
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THANK YOU
http://www.zeroplus.org/

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