## How can the STREAMER results help?

**The STREAMER results** have been developed and demonstrated in direct collaboration with four large hospitals in Italy, France, The United Kingdom and the Netherlands where the methodologies and tools have been tested and evaluated.

While the STREAMER results have been created with hospitals as application domain in mind, the results have a broader application. We believe any complex building can benefit from the STREAMER approach.

## Project partners

TNO, the Netherlands

Ipostudio Architetti, Italy

De Jong Gortemaker Algra Architects and Engineers, the Netherlands

Becquerel Electric, Italy

DWA B.V., the Netherlands

AEC3 LTD, United Kingdom

Karlsruher Institut fuer Technologie, Germany

Demo Consultants, the Netherlands

Bouygues Construction, France

NCC AB, Sweden

Mostostal Warszawa SA, Poland

Stichting Rijnstate Ziekenhuis, the Netherlands

APH Paris, France

The Rotherham NHS Foundation Trust, United Kingdom

AOC Careggi, Italy

Mazowiecka Agencja Energetyczna, Poland

Commissariat a lénergie atomique, France

Centre Scientifique et technique du batiment, France

Locum AB, Sweden

### More information and contact

For more information, refer to our website at
www.streamer-project.eu
where the public deliverables are found.
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**STREAMER** - an industry-driven collaborative research project on Energy-efficient Buildings (EeB) with cases of mixed-use healthcare districts that aims to reduce the energy use and carbon emission of new and retrofitted buildings in healthcare districts in the EU by 50% in the next 10 years.

# Streamer

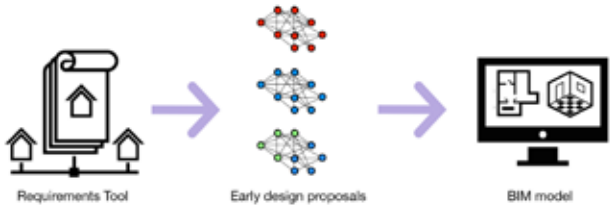
*European research on energy-efficient healthcare districts*

**www.streamer-project.eu**

## STREAMER: Designing energy-efficient hospitals

Hospitals are among the buildings with the highest energy consumption – in average a hospital consumes 2.5 times more energy than an office. This is mainly due to the complexity of the building and utility systems in a hospital in order to accommodate energy-intensive medical equipment and processes.

The STREAMER project focuses on the design phase of hospitals, because design decisions evidently have a large impact on the energy efficiency of the newly constructed or refurbished hospital buildings. STREAMER has generated methodologies and tools which assist interdisciplinary design teams to analyse and select the most energy-efficient design solutions. STREAMER methodologies and tools are innovative for their applicability in the early design phase where traditional design methods falls short in term of semantic and holistic insight.




## STREAMER results

**The STREAMER methodologies** and tools are developed to be complementary with each other when applied in design practice.

The STREAMER methodologies comprise:

- **The 'semantic labels' design concept.** This concept allows the designer to attach design-related semantic properties to space units (i.e. rooms) in the early design phase even though much detailed information is still unknown. These semantic labels express the 'design rules' which capture the knowledge of designers, and in turn are useful to create and validate design alternatives.
- **Guidelines** enriched with best practices for design teams. These guidelines also incorporate the viewpoints of various stakeholders (i.e. hospital manager, medical staff, patients, local authorities) who are involved in an optimal decision-making concerning design quality, energy efficiency, cost effectiveness. These guidelines also contain organizational approaches to speed up the design process for new buildings and retrofit situations.

**The main STREAMER tools** that complement the methodologies are:

- **An Early Design Configurator (EDC) and Design Validator** for creating and tentatively validating design alternatives based on the end-user's Programme of Requirements. Using the EDC, the design alternatives in Building Information Model (BIM) are automatically generated based on the design rules within predefined boundary conditions, such as building's outlines and geographic location.

- **A Decision Support Tool (DST)** for comparing various design alternatives and performing multi-criteria analysis against a set of STREAMER Key Performance Indicators (KPIs) which address energy efficiency, total cost of ownership, and quality.

Along with these main results, many supporting project outcomes are available to facilitate the achievement of creating energy-efficient hospitals. Among these outcomes, there are tools for: preliminary calculation of energy demand in early-design and developed-design phases; validation of IFC files (open standard of BIM) which are exchanged during the design process; document management and collaboration process steering; and capturing best practices into semantic design rules.

On the engineering side, STREAMER has created a comprehensive overview of various solutions for MEP (Mechanical, Electrical and Plumbing) systems and building envelopes for energy-efficient hospitals. Additionally, STREAMER has also developed practical approaches to analyse energy-related aspects at campus and district scale with a particular aim to explore possible optimizations between various buildings within a hospital campus and the local district concerning energy production, consumption, distribution and storage.

## STREAMER impact

In a **STREAMER - supported design process**, more design options are kept open and they can all easily be evaluated in terms of energy, cost and quality. This enables design teams to choose the best alternative. Optimal choices can be made for room placement and selection of HVAC equipment, in relation to choices for facade technologies. As an example: a poorly designed ventilation system has been seen to account for 40% of the total hospital's energy bill – that is just for moving air, not even including heating or cooling!