

A MULTIDISCIPLINARY RESEARCH PLATFORM TO BOOST INNOVATION IN THE BRUSSELS RENOVATION MARKET

BXL RETROFIT

INNOVIRIS STRATEGIC PLATFORM
ENVIRONMENT

BRUSSELS RETROFIT XL is a **multidisciplinary platform** on various retrofitting aspects with clear valorisation potential for the Brussels housing market. Thirteen Brussels research teams with different expertise in the field of renovation are united in order to **stimulate innovative renovation initiatives and map opportunities for the urban context**.

The research conducted within the platform is organised according to four major themes: 'energy and comfort improvement', 'sustainable materials, components and concepts', 'application and industrialization' and 'socio-economic and environmental aspects'.

The Strategic Platforms cover the field of academic research with a clear focus on industrial applications; one of the strengths lies in the **dialogue and interaction between research teams**, each with their expertise and competences in different disciplines (architecture, construction techniques, material science, thermo-mechanics, heritage value, structural design, life cycle thinking...).

RETROFITTING OF THE BUILT ENVIRONMENT (HOUSING)

Energy and
comfort
improvement

Sustainable mate-
rials, components
and concepts

Application and
industrialization

Socio-economic and environmental aspects

ENERGY and COMFORT IMPROVEMENT

RetroCo

Understanding and conserving the post-war housing stock in Brussels (1945-1975). Retrofit for continuity!



While the main reasons to renovate (financial, social and energetic) are perfectly legitimate, all too often renovation projects do not build upon or integrate the historical characteristics of the building. In order to address the lack of criteria to determine the historical value of post-war heritage, RetroCo compiles a building manual for post-war housing in Brussels providing an overview of (new) materials and techniques commonly used in 1945-1975. This manual will enable the various actors (owners, architects, contractors, heritage researchers, Direction of Monuments & Sites,...) to identify the structural and material qualities of the building and propose corresponding levels of intervention strategies.



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WINEGRATE

Wind energy and wind conditions in the built environment

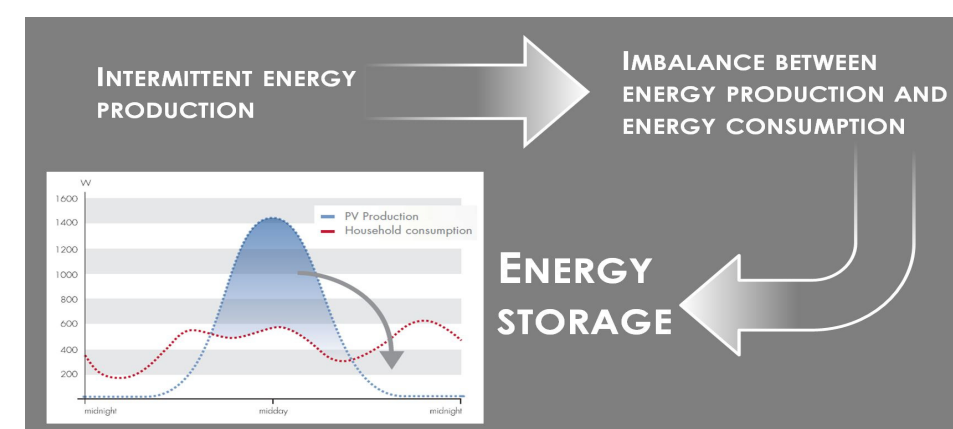
The primary goal of the Winegrate project is to optimally integrate small wind turbines in the built environment. This entails a cost-effective installation that yields the maximum possible energy production at a specific site while guaranteeing the long-term integrity of the supporting structures and minimizing the nuisance for occupants.

The project combines wind, performance and vibration measurements on existing wind turbines with state-of-the-art modal analysis. Based on the data we shall analyze the structural effects of turbines on buildings and different methods to mitigate these, through improved mounting methods and added damping, with the aim of preparing a number of demonstration projects in Brussels.



MESB

Micro Energy Storage in Buildings



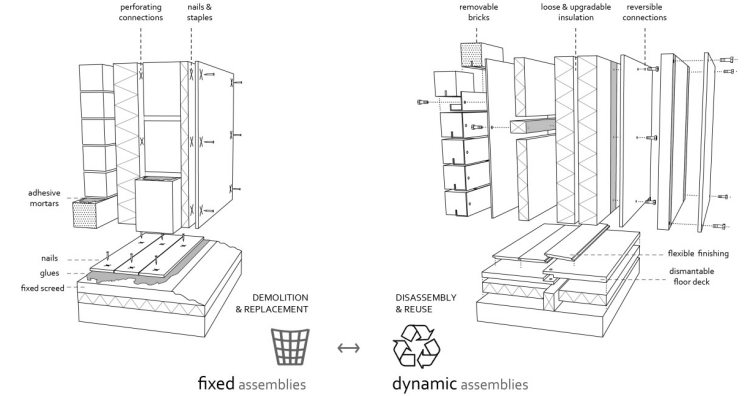
Growing utilisation of intermittent electrical energy sources is leading to a temporal mismatch between energy production and consumption. For a balanced and efficient use of energy, storage is needed. The Micro Energy Storage in Buildings (MESB) project intends to parameterise, assess the feasibility and optimise the use of small-scale energy storage in buildings, a topic where little research is available. Several technologies will be analysed and a decision tool will be made publicly available to design optimised energy storage solutions. This work will facilitate the deployment of small-scale energy storage systems in buildings allowing a balanced and efficient use of energy.



APPLICATION and INDUSTRIALIZATION

DynStra

Dynamic Reuse Strategies for the retrofitting of post-war housing in Brussels



The DynStra project puts forward a dynamic renovation approach for representative post-war building typologies in Brussels. Seen their concept of modular, prefabricated units and standardised building elements, post-war dwellings are often suitable to be retrofitted according to approaches that rely on dismantling, reuse or upgrade of separate building elements. A flexibility matrix is developed, indicating for which building layers it is a priority to develop dynamic building solutions during renovation. Subsequently, dynamic renovation scenarios are developed vertical building elements. Finally, the project aims at transmitting the first research results to practical applications by testing of real-scale models using reusable and standardised building components with reversible detailing.



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AIM-ES

High-efficiency rehabilitation of (semi-)identical urban housing ensembles: Experience-based guidelines for Architectural Industrialized Multifunctional Envelope Systems

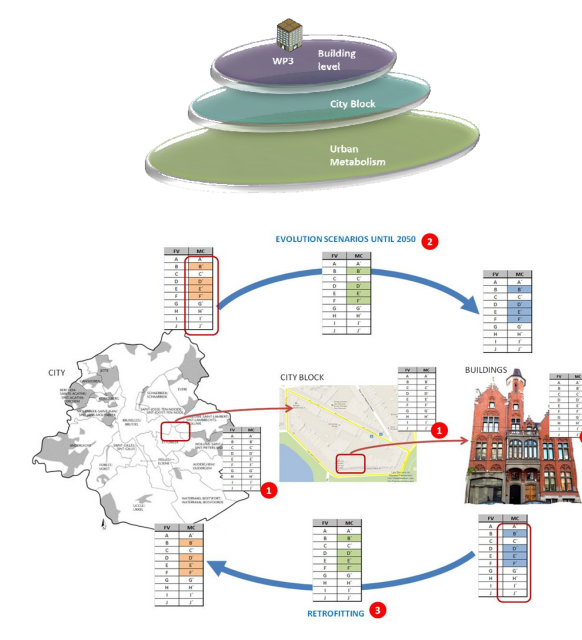
The project AIM-ES revolves around the theme of energy consumption reduction and comfort improvement within ensembles of low-rise buildings, showing a (semi-)repetitive architecture. This building typology may benefit from an industrialized approach, where prefabricated (multifunctional) façade modules are applied to the exterior of buildings, combining a quick mounting and large energy savings with minimal disturbances. An analysis of several European projects serves as input to explore relevance for the application of such systems in Brussels. The final outcome of the project is an experience-based set of guidelines, aiming at each level in the chain of stakeholders.



B³-RetroTool

Sustainable retrofit of urban blocks and buildings in Brussels Capital Region

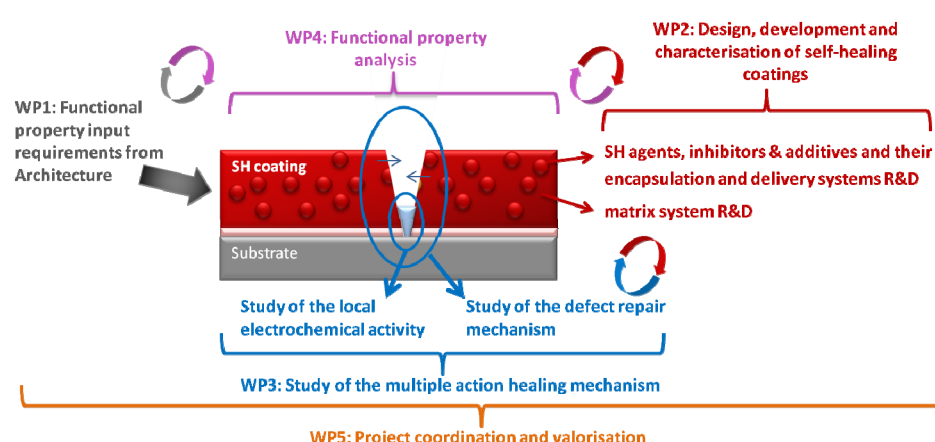
This project offers a new vision of Brussels Capital Region (BCR) as an Urban Metabolism which will be defined at three different but complementary scales (city, urban blocks and buildings) to identify typologies and propose suitable urban or architectural interventions in each situation to preserve heritage value and chose relevant energy performances, materials and systems. The study target is to achieve a pre-assessment tool to retrofit the city and its buildings in an integrated multi-criteria and multi-scale approach. The originality of this project is to identify new determinants in designing modern, economic and efficient city block using a multi-criteria and multi-scale approach.



SUSTAINABLE MATERIALS, COMPONENTS & CONCEPTS

SHARC

Self-Healing coatings in Architecture



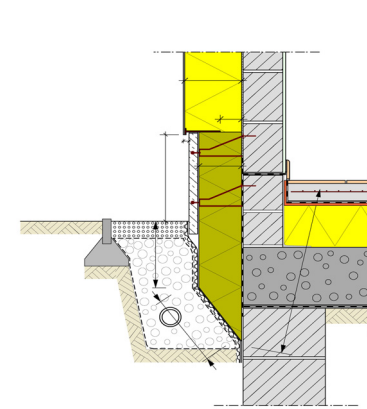
Metals are and have been widely used for many decades in building & construction world-wide, but the main drawback is their susceptibility to corrosion. The main objective of SHARC is the study and development of robust self-healing coating systems for the long term durable protection of existing metal structures, as well as replacement elements, in architectural renovation projects. The project follows the innovative 'damage management' concept: the coatings contain self-healing mechanisms to repair surface defects and as such restore the initial properties of the structure even after multiple damage events.



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INNOV-ETICS

External thermal insulation composite systems: Technical investigations on high performances emerging innovative solutions for the retrofitting of housing



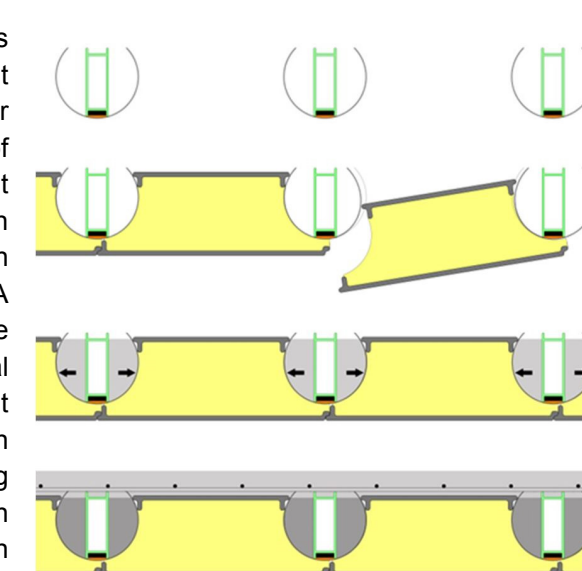
This project is focused on the retrofitting of existing façades in Brussels thanks to external thermal insulation composite systems (ETICS). The motivation of the research is expressed by the fact that the great amount of emerging innovative solutions has not yet been proved to be a durable technique. The aim of the research is to improve the knowledge of 'new materials' when combined in ETICS thanks to experimental investigations and to disseminate the results to the sector. The use of emerging innovative materials and accessories are investigated to optimize specific solutions for the context of Brussels.



LightComp

Design of lightweight building components for the renovation and reconversion of existing buildings

In renovation of residential buildings, one is often confronted with the need for a lightweight floor that is manually installable, e.g. for replacement of wooden floors, addition of storeys, etc. In this project LightComp, we want to explore how combining composites - an emerging construction material - with traditional concrete can answer this need. A new composite-concrete floor system will be designed, focusing on increased mechanical performance (loadbearing capacity to weight ratio of components) and facilitated installation (reduction labour) with reference to existing solutions. The project comprises both conceptual design and structural optimisation as well as a wide analytical and experimental structural analysis program.



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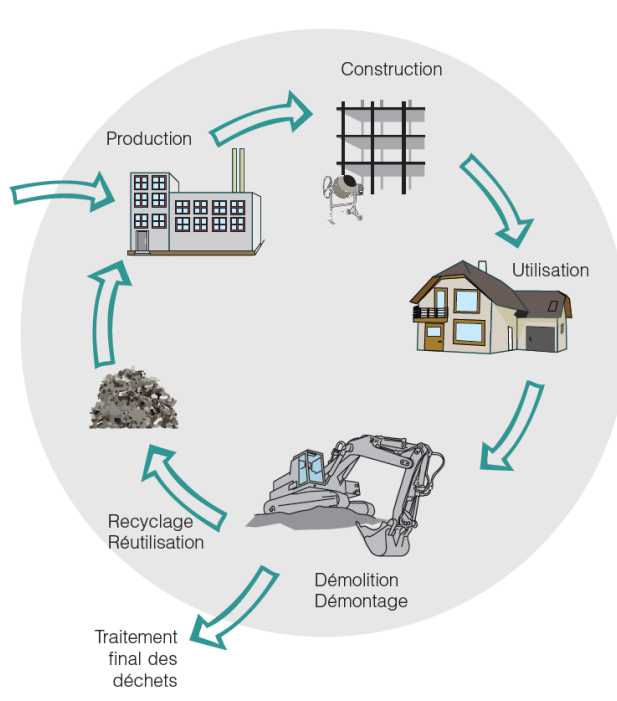
LIFE CYCLE THINKING

LC-Build

Evaluation of retrofitting concepts from a life cycle perspective

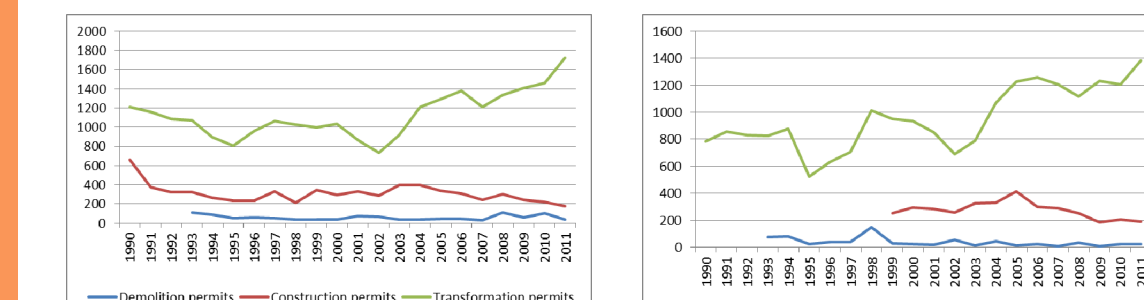
Both environmental and social aspects related to the retrofitting industry are considered from a life cycle perspective in the LC-Build project. By conducting LCA studies for several platform projects, they gain insights in how to reduce environmental impacts and optimize their proposed technologies from an environmental point of view.

Social aspects of Brussels building retrofitting concepts are considered through Social Life Cycle Assessment (s-LCA). Currently, this assessing technique does not account for criteria that allow distinguishing social impacts of two systems produced in Brussels. Relevant criteria for the specific context are developed: by adapting the methodology to retrofit, and by creating new local indicators for the social impact assessment.



IRHIS

Integrated approach to support and develop economic activities in the Brussels Renovation sector of Housing including socio-economic concerns



Evolution of the number of permits and work starts in the Brussels-Capital Region for building construction, demolition or transformation [Source: based on data from DGSIE, Statistics on building permits 1990-2012]

Based on an overview of the Brussels market and its main characteristics, the IRHIS project covers two different socio-economic approaches. In the "macro" approach the different barriers to sustainable housing renovation in the Brussels context are identified and the "missing" activities/actors (e.g. financing, technical expertise or both) that impede further development of the sector are analysed. The "micro" approach concerns the identification of specific barriers and success factors, cost-benefit analyses (CBA), analyses of public acceptance or potential impacts on the labour market for several projects of the platform.



More information available on

www.BrusselsRetrofitXL.be

The Strategic Platforms launched by the Brussels Region cover the field of academic research with a clear focus on industrial applications for the Brussels Region. The program aims to strengthen the technological potential of the Brussels-Capital Region in those research topics that might be beneficial to companies in the Brussels Region on a short/mid-long term. Therefore, the Strategic Platforms are dedicated to research units belonging to universities, higher educational institutions and collective research centres located within the Brussels-Capital Region. The program attempts to encourage networking between research teams of the highest standards in the Brussels Capital-Region.

