EUROGYPSUM

THE VOICE OF THE EUROPEAN GYPSUM INDUSTRY

THE MULTIFACETED ASSETS OF *plaster and plasterboards solutions* IN BUILDING RENOVATION

"A sustainable building is not one that must last forever, but one that can easily adapt to change."

Peter Graham, Environment Design Guide
2006, Royal Institute of Australian Architects

Contents

Renovation of Buildings: what does it mean? 2

Renovation: Purposes and Benefits 3

Advantages of Plaster and Plasterboard in Renovation 4

CASE STUDIES

Improving the Environmental Aspects of Renovation

Case study #01 | Positive Energy Building 6

Improving the Social and Health Aspects of Renovation

Case study #02 | Sustainable redevelopment of 1960's housing 8

Case study #03 | Creating a comfortable and safe built environment 10

Ensuring the Cultural Heritage of Historical Buildings

Case study #04 | Upgrading buildings and places while respecting their character 12

Case study #05 | Innovating while preserving the old 14

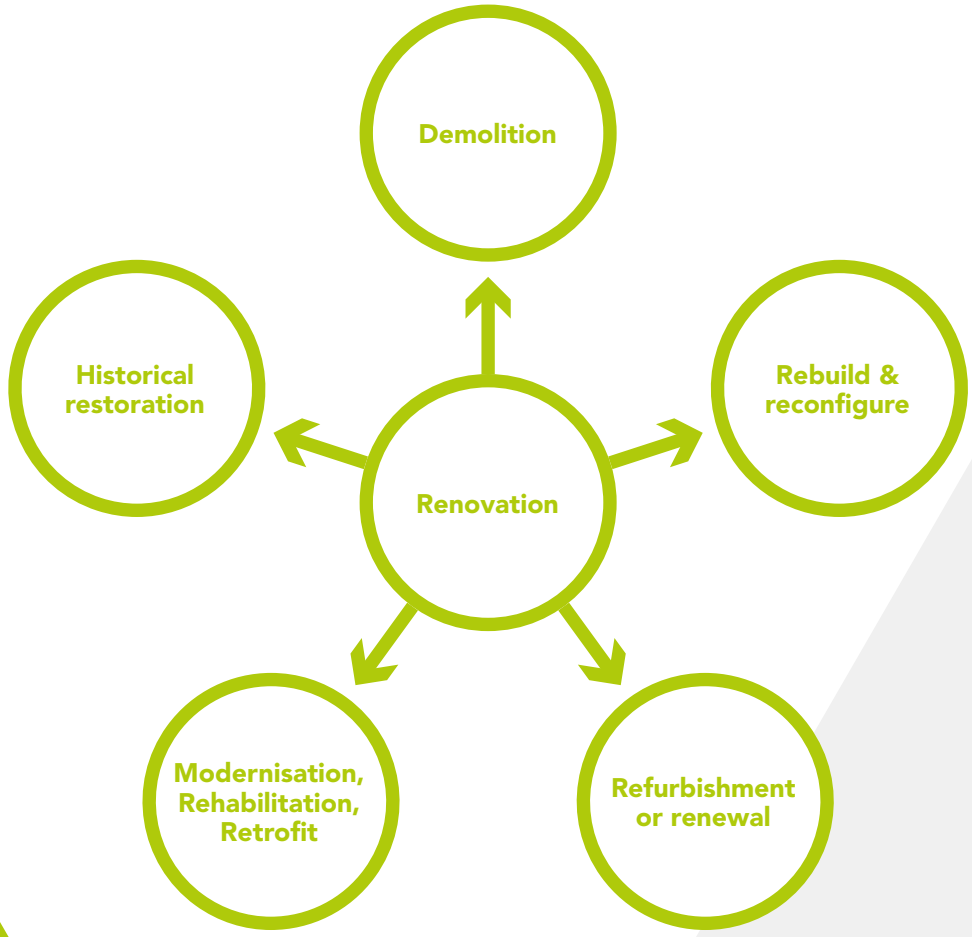
Case study #06 | Preserving and transmitting cultural objects, historical and cultural values 16

Promoting a healthy indoor climate

Case study #07 | Ceiling tiles and plasterboard helped create a healthy indoor environment 18

What about Sustainable Renovation? 20

Renovation of Buildings: What does it mean?

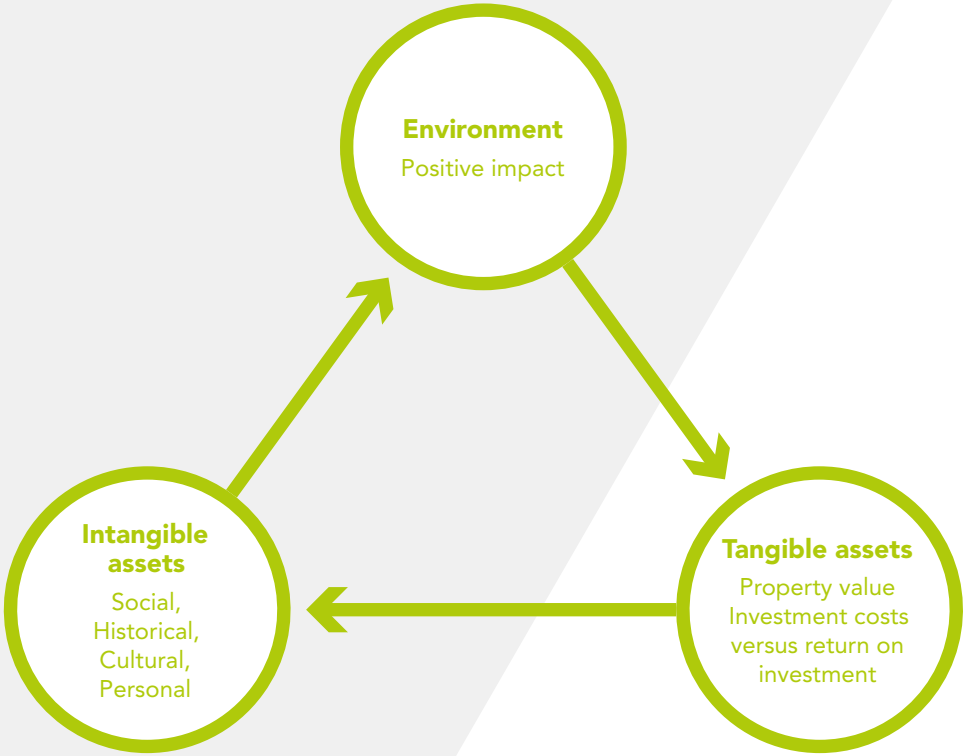


There is no general definition to describe building changes, but a large variety of partly overlapping terms are in use. Among the common terms are alteration, adaptation, renovation, rehabilitation, refurbishment, retrofitting, restoration, reconstruction, retro-commissioning, modernization, transformation, tune-up. The use of this diverse terminology is due to the varied type and scale of buildings, the large range of actions, and the variety of reasons and motivations for making an intervention, e.g. preservation, technical, functional or social obsolescence.

WE COULD DEFINE RENOVATION AS:

- Work that involves the substantial alteration of buildings (rebuild or reconfiguration) that includes structural or partitioning works.
- The substantial replacement of main services or finishes and/or
- The improvement of floor space, in existing or new buildings, that includes associated redecoration and repair works.

Renovation: Purposes and Benefits



ENVIRONMENT

- Promote greater reuse of materials. Indeed, the structure of the building can be maintained thereby saving natural resources;
- Reduce landfill disposal and costs in comparison with demolition;
- Reduce the energy consumption in buildings using insulation materials.

INTANGIBLE ASSETS-SOCIAL, CULTURAL, HISTORICAL

- Preserve cultural and historical assets;
- Adapt a property to other uses;
- Re-develop the internal space;
- Solve technical or performance deficiencies of buildings;
- Upgrade the building to the regulatory or additional voluntary standards.

TANGIBLE ASSETS-ECONOMIC

- Increase the financial value of the property and transfer renovation cost upon rent;
- Increase the useable life of the asset.

Advantages of Plaster and Plasterboard in Renovation

MULTI-FUNCTIONAL AND MULTI-PERFORMANCE SOLUTIONS

- **Sound insulation:** providing protection against noise transmissions from interior or exterior sources. Systems can be provided with a range of different acoustic insulation levels;
- **Fire resistance:** the chemical structure of plaster based products enables them to delay fire spread within a building;
- **Thermal comfort:** the hygroscopic properties of plaster enable insulating building systems, keeping building interiors warmer in the winter and cooler in the summer;
- **Environmental impact:** plaster products offer a low embodied energy and are indefinitely recyclable.

ADAPTABLE

- Enable flexible and adaptable architecture: spaces can be converted easily using demountable products and systems;
- Offer complete solutions for different building systems: partitions, floors, linings, ceilings, fire exits, smoke ducts, etc;
- Allow renovation while building in use: works can be completed in short periods of time;
- Enable remodelling building interiors without touching the structure;
- Flexibility on installation projects: mechanical and electrical services can be fitted within plasterboard systems;
- Aesthetics: can be adapted to any project and building function with high aesthetical qualities.

ECONOMICS

- The ease and speed of installation increases jobsite productivity and reduces total cost;
- The internal cavity (free space) inside plasterboard partitions and ceiling plenums optimise maintenance costs. For example, it is easier to detect leakages and replace pipes;
- Lower total cost of ownership: in addition to lower maintenance costs, building works are completed easily with spaces ready in a short space of time.

Plaster and plasterboard solutions in renovation
Indefinitely recyclable
Cost-effective
Multi performance – fire thermal acoustic in one solution
Create additional living space
Adaptable-flexible in architectural design
Multifunctional
Easy to transport and to install
Speed of installation
Exterior and interior aesthetics maximised and maintained

Case study #01 I Improving the Environmental Aspects of Renovation

Positive Energy Building

Locality:
Munich (Germany)

Type:
Domestic Renovation

Contractor:
Marc Aurelius GmbH & Co. KG, München

Planning:
Architect Dipl.-Ing. Detlef R. Böwing, München

Domestic engineering:
Integriertes Planen, Friedrich Hamp, München

Facade:
Restauro Putz GmbH Arte Antica, München

Interiour Plaster:
Pika-Bau GmbH, München

Heating floor screed:
Singhammer Bodensysteme GmbH, Rimsting

Drywall:
Hillabrandt/Huber, München

Technical Advisory Service:
Knauf Gips KG, Hans Heinzl, Erwin Lindermaier, Georg Achatz, Knauf Insulation GmbH, Mathias Kratzer

Photographs:
Knauf / Bernd Ducke

OPTIMISING ENERGY AND PERFORMANCE WITH NEW TECHNOLOGIES

The aim of the building project in the Munich Landwehrstraße was to refurbish an existing building so it could be heated completely without oil or gas, wood or district heating. The existing building complex consisted of a living and industrial real estate area of 1,600 m² with an annual energy demand of approximately 30 l/m². After the refurbishment, that included an 800 m² extension, an annual energy demand of 1.6 l/m² has been achieved.

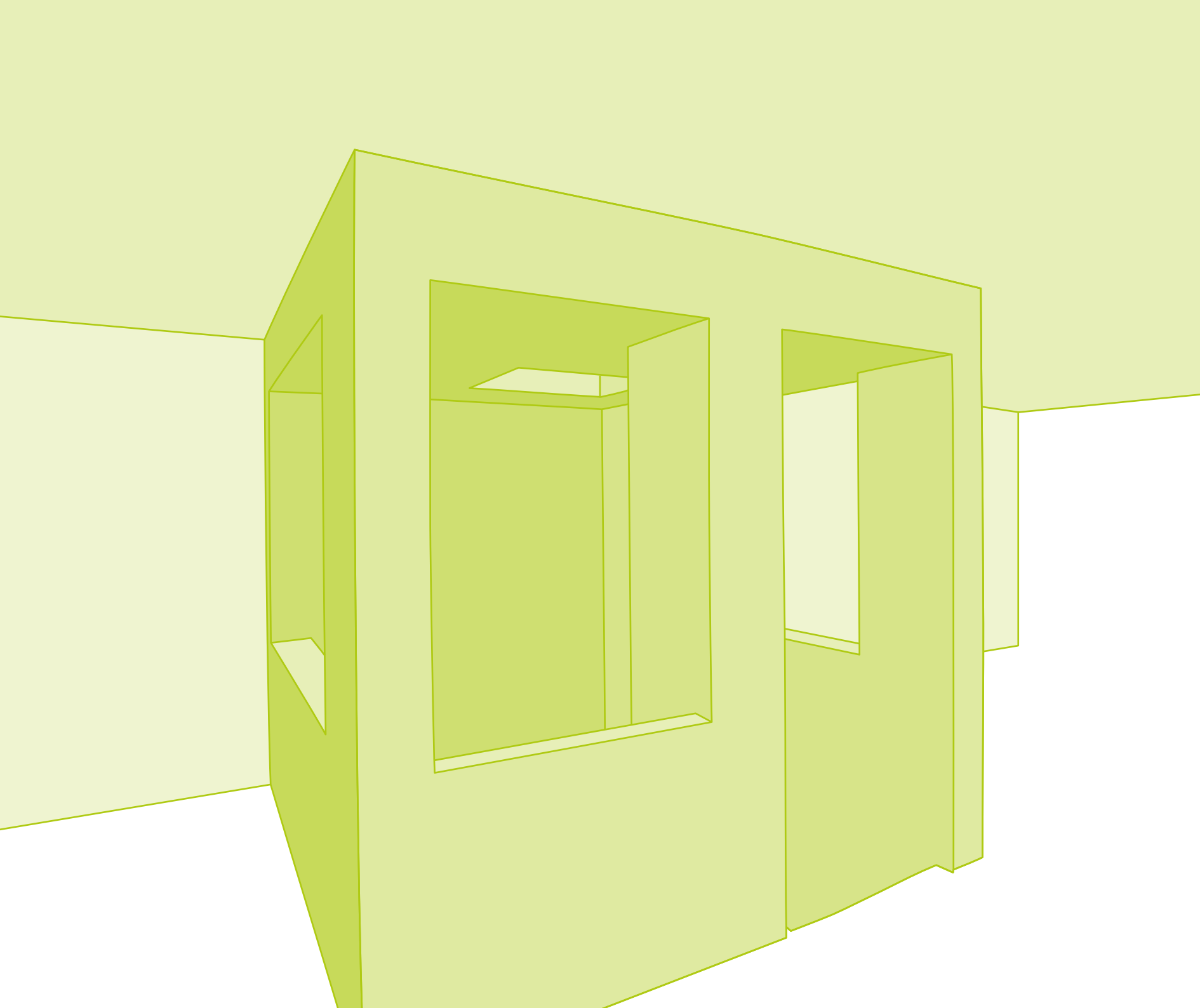
A combination of different measures enabled this achievement; consisting of a heat insulation compound system with 10 to 12 cm EPS insulating boards on the frontage and a new roof and windows with premium heat protection glazing. The housing ventilation includes a heat recovery system that reduces the energy demand for the heating of the ambient air by approximately 85%. The energy production is connected to thermic solar system combined with a groundwater heat pump. The 3.3 kWp photovoltaic installation on the roof produces the current for the house.

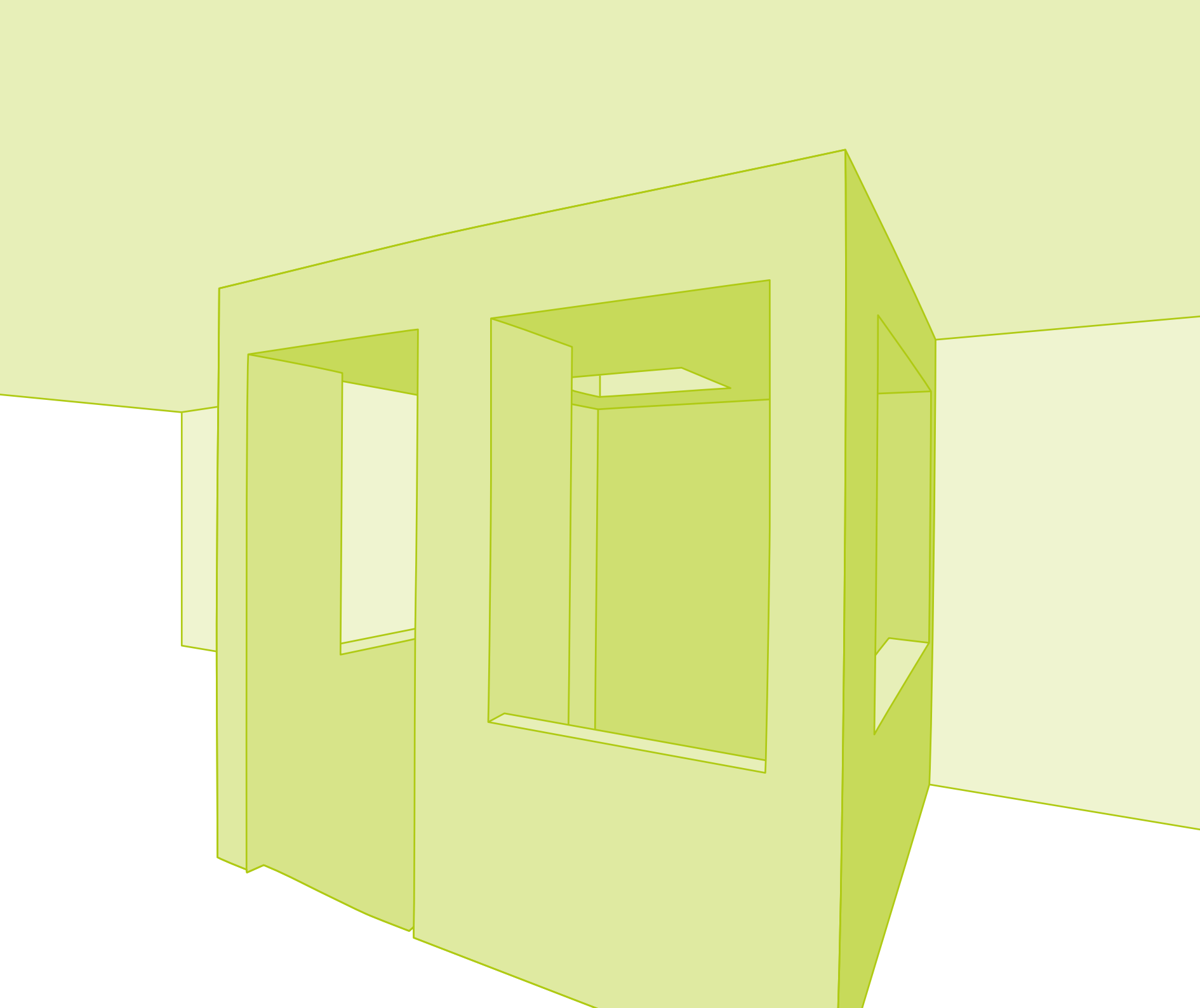
The heat dammed hat which is placed on the old buildings wing by the builder-owner, provides additional living space. The roof was constructed with wood soft fiber boards on the outside and a 200 mm clamping felt within the rafters. The system fitted under the rafters guarantees air tightness. The roof slope is wainscoted with 15 mm fire protection panels.

Besides the heating protection a high optimal acoustic protection level was set. Drywall construction systems in the attic floor were acoustically decoupled from the solid construction. All interior walls in the old and new building area were constructed with two-sided planked - constructions made of 20 mm gypsum Boards. The 90 mm thick walls achieve approximately 5 dB better sound insulation values than the common panels. These optimized walls also form the basis for elegant design in the integrated sliding elements.

The apartment partitions required even higher requirements. They were designed as fire-resisting walls with steel sheet deposits and finished with 15 mm Gypsum Boards on both sides, each with two layers, this enabled an acoustic isolation value of 64 dB. The walls achieved WK2 classification for housebreaking security due to their steel sheet deposit. For acoustic reasons the facing formwork (for instance behind the ventilation system) was decoupled with CD Channels and Damping Universal Brackets off the usual masonry and coated with gypsum Boards.

... so it could be heated completely without oil or gas, wood or district heating





Case study #02 I *Improving the Social and Health Aspects of Renovation*

Sustainable redevelopment of 1960's housing

Locality:
Germany - Kronberg

Type:
Domestic Renovation

Contractor:
DeWAG 1. Objektgesellschaft mbH, Stuttgart

Architect:
Wolfgang Ott, Dipl.-Ing. Architekt BDA, Kronberg

Statics:
Ingenieurbüro für Baustatik Zendel, Wiesbaden

Fire protection concept:
Brandschutz-Consulting Dipl.-Ing. Herrmann, Fulda

Technical Advisory Sercvice:
Knut Anthes, Knauf Gips KG

Photographs:
Knauf / Kraneburg

PROVIDING ADDITIONAL LIVING SPACE

There is a trend to moving "back to the city"; small and medium-sized towns in metropolitan areas are attracting singles, couples, families and elderly people who are looking for an urban and relaxed sense of life. Kronberg in the periphery of Frankfurt am Main is one example of these areas.

The housing complex in Kronberg, built in the 1960's, met the conditions for a premium and sustainable refurbishment. The complex allowed the addition of new stories and nine generous penthouse apartments were added, some as maisonettes over two floors.

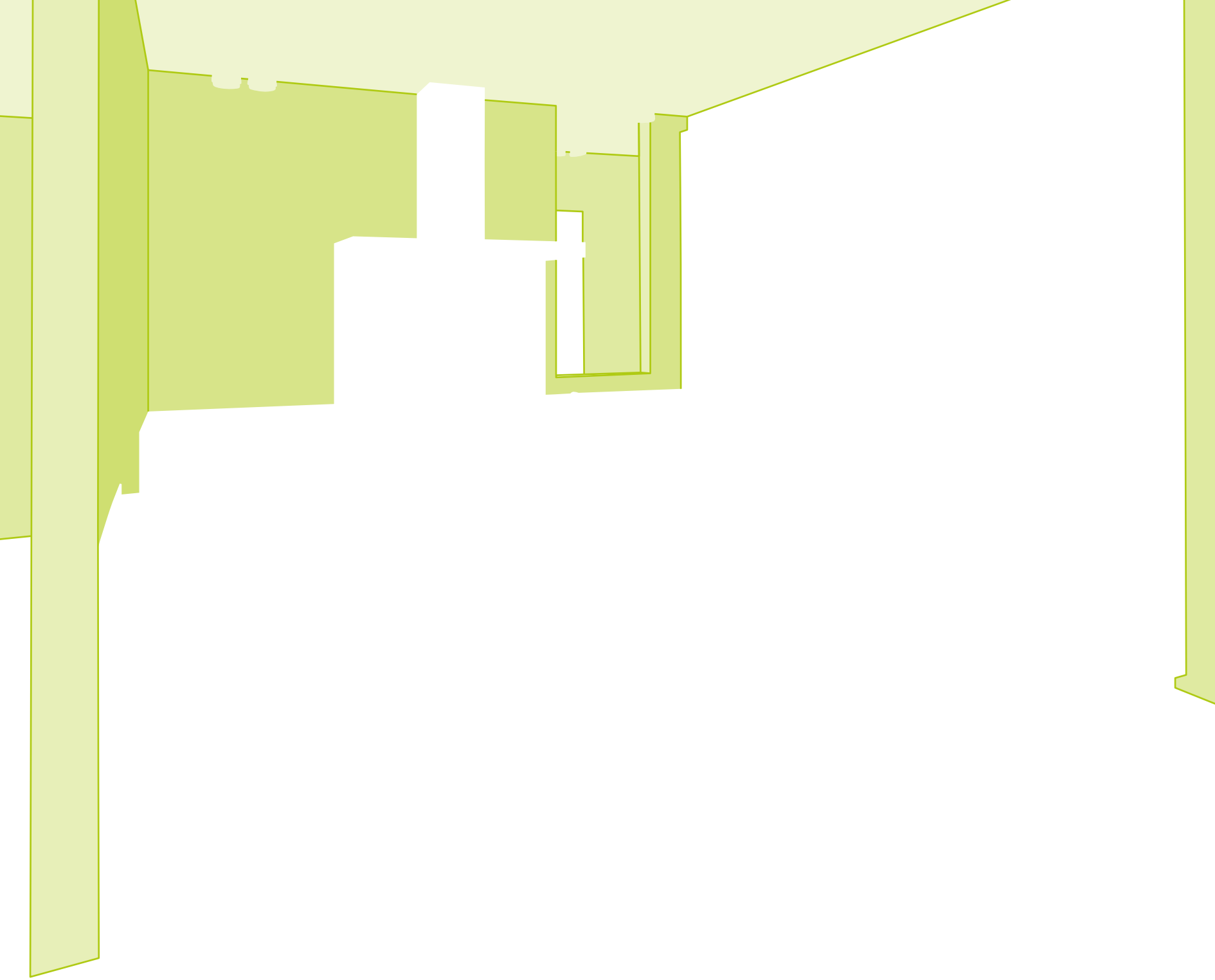
The architect, Wolfgang Ott from Kronberg, used a timber panel frame structure for the new floors, girders made of wood and steel were fitted over the existing roof of the buildings. "*Our approach was it to save weight, use as few as possible static reinforcements on the structure and accomplish a high independence from the structure*".

FIRE PREVENTION AND SOUND PROTECTION

The outer walls are made of a 200 x 120 mm timber frame with two layers of high performance plaster board each side and a formaldehyde free insulation. Plasterboard provided racking / stiffening performance to DIN 1052:2004-08 and fire prevention to 90 minutes with acoustic insulation.

The inside supporting timber panel walls were finished on both sides with 15mm high strength board and mineral wool insulation to comply with the F90-BA. The internal dividing walls, constructed in the same way, are uncoupled with a 20 mm thick dividing layer. This solution fulfills the highest standards with a rated acoustic insulation dimension of R'w,R ≥ 70 dB.

The fire prevention standard F90-BA for the roof of the two-floor was achieved with a two-ply 20 mm thick solid construction.



Creating a comfortable and safe built environment

Locality:
United Kingdom
Ystradgynlais

Type:
School Renovation

Client:
Powys, Ceredigion and Gwynedd County Council

Architect:
Powell Dobson

Contractor:
Willmott Dixon

Sub-contractor:
Manorcraft

Technical support:
Siniat UK

SAVING INSTALLATION TIME AND COSTS WHILE ACHIEVING THE REQUIRED ACOUSTIC LEVEL

Delivering cost effective and functional buildings is imperative in the education sector, where facilities call for impressive technical performance at scale.

The high school has been upgraded as part of Powys, Ceredigion and Gwynedd County Council's wider investment in the building and redevelopment of schools in the area. The extensive refurbishment included upgrades to the music rooms and performance halls – often challenging areas to specify because of the demanding acoustic levels needed. Plasterboard was able to meet the crucial acoustic requirements for these rooms, removing the need for a special acoustic board and allowing the contractor to use just one material throughout.

Saving installation time is important on any education project, particularly as schools have restricted times for construction work to be undertaken and often cover large areas. One of the advantages of the plasterboard used was that it had a unique pre-sealed decorative surface. This means that once installed, using the corresponding joint fillers and finishes, the walls can be decorated immediately – removing the need for separate onsite sealing and reducing the installation time considerably.

The two-phase project was finished in June 2012, with the secondary school opening its doors during that month. The refurbished spaces include a new teaching block and upgraded dining hall, server, science areas and improved administration and conference facilities.

› Illustratives photos

Case study #04 I *Ensuring the Cultural Heritage of Historical Buildings*

Upgrading buildings and places while respecting their character

Locality:
GAK Kantoor, Amsterdam (The Netherlands)

Type:
Student housing

Contractor:
MAT Afbouw is a leading company specialized in metal stud systems with innovative solutions for fire, noise, acoustics and burglar and bullet resistance and logistics.

Building owner: AM

Architect:
Wessel de Jonge architecten bna

Photographer:
Pieter Bas / Fotograaf MAT

Key Project Advisor:
Saint-Gobain Team Randolf de Jong

REFURBISHMENT AND TRANSFORMATION OF AN OFFICE BUILDING INTO 320 STUDENTS HOUSING STUDIOS

Amsterdam currently has a severe lack of housing units for students, but has a lot of unoccupied business real estate. Within 6 months MAT has transformed a 50 year old office building into 320 housing units. The interior floors were stripped of interior construction and rebuilt at a pace of one level per week. The large suspended ceiling had to be free of vibrations and the small work space was the main challenges. Only innovation and smart entrepreneurship could make this happen.

KEY CHALLENGES

The original character of the building has been preserved during the transformation. The 50 year old building was a frame of columns and beams with a thin concrete floor of 40 mm. The biggest challenges for this project were: the high standards for fire resistance, sound insulation for both the wall and ceiling systems and the high pace in construction in a densely populated city area. The double plasterboard plated ceiling had to be suspended and free of vibration over a very large span, which carried the risk of sound leakage and sagging.

KEY ACHIEVEMENTS

Using plasterboard the final building of 320 studios was delivered with a cost reduction of 3%, a better technical (acoustical) performance than specified. Working with the manufacturer the installer took on the engineering role for the contractor enabling a fast paced friendly process to be achieved.

The original character of the building has been preserved during the transformation

Case study #05 I Ensuring the Cultural Heritage of Historical Buildings

Innovating while preserving the old

Locality:
De Fundatie Museum
Zwolle, Netherlands

Type:
Public Building Renovation

Developer:
Museum de Fundatie

Architect:
Biermanhenket Architecten

Drywall contractor:
Griemink Klazienaveen BV

Photographer:
Joep Jacobs

Technical support:
Siniat Benelux

INNOVATIVE DESIGN AND HIGH TECHNICAL CONSTRAINTS

Located in Zwolle (Netherlands), the De Fundatie Museum has just been extended with a spectacular elliptical volume on the roof of the old courthouse. This neoclassical building from 1840, since 2004 it has hosted the museum collections, including works by Rembrandt, Saenredam, Turner, Monet, Rodin, Van Gogh, Mondrian and Van der Leck. Due to the success of its exhibitions, the expansion of the museum became necessary.

THE CONCEPT – ART CLOUD

Bierman Henket Architecture Studio designed the elliptical volume dressed by 55,000 ceramic three-dimensional elements from white to blue colour tones. This Art Cloud, as the extension was called, includes two exhibition spaces adding 1,000 sqm which has doubled the capacity of the museum. A central atrium above the existing hall connects the old and the new museum.

CHALLENGES

Big challenges were faced to build that additional futuristic volume above the roof: short budget, jobsite time limited to 16 months, work to be done in a tight urban area, and the fact that the construction structure (eight columns on steel over own foundations) should be disposed transversely to the existing building with low impact on it.

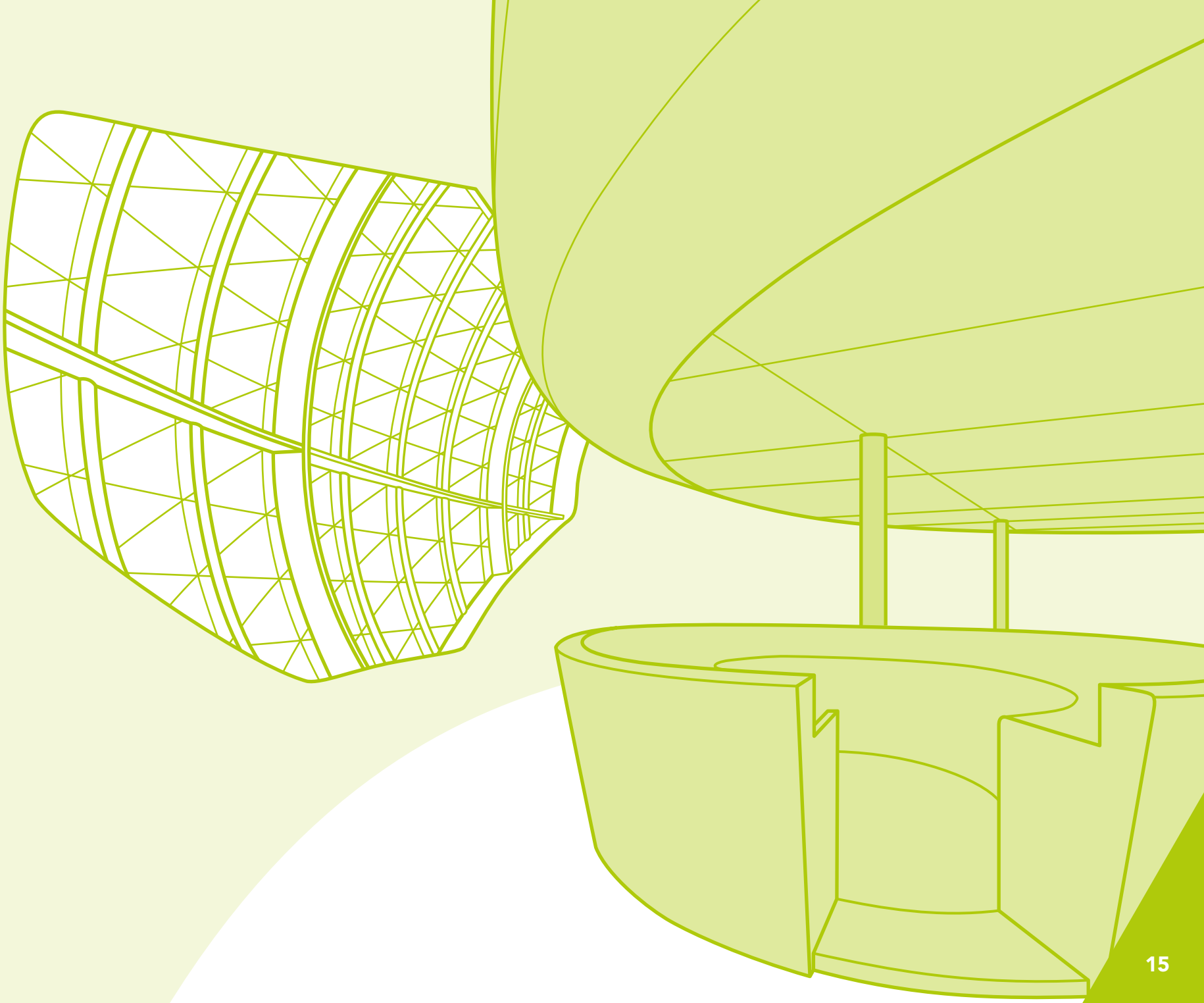
SUSTAINABLE MATERIALS

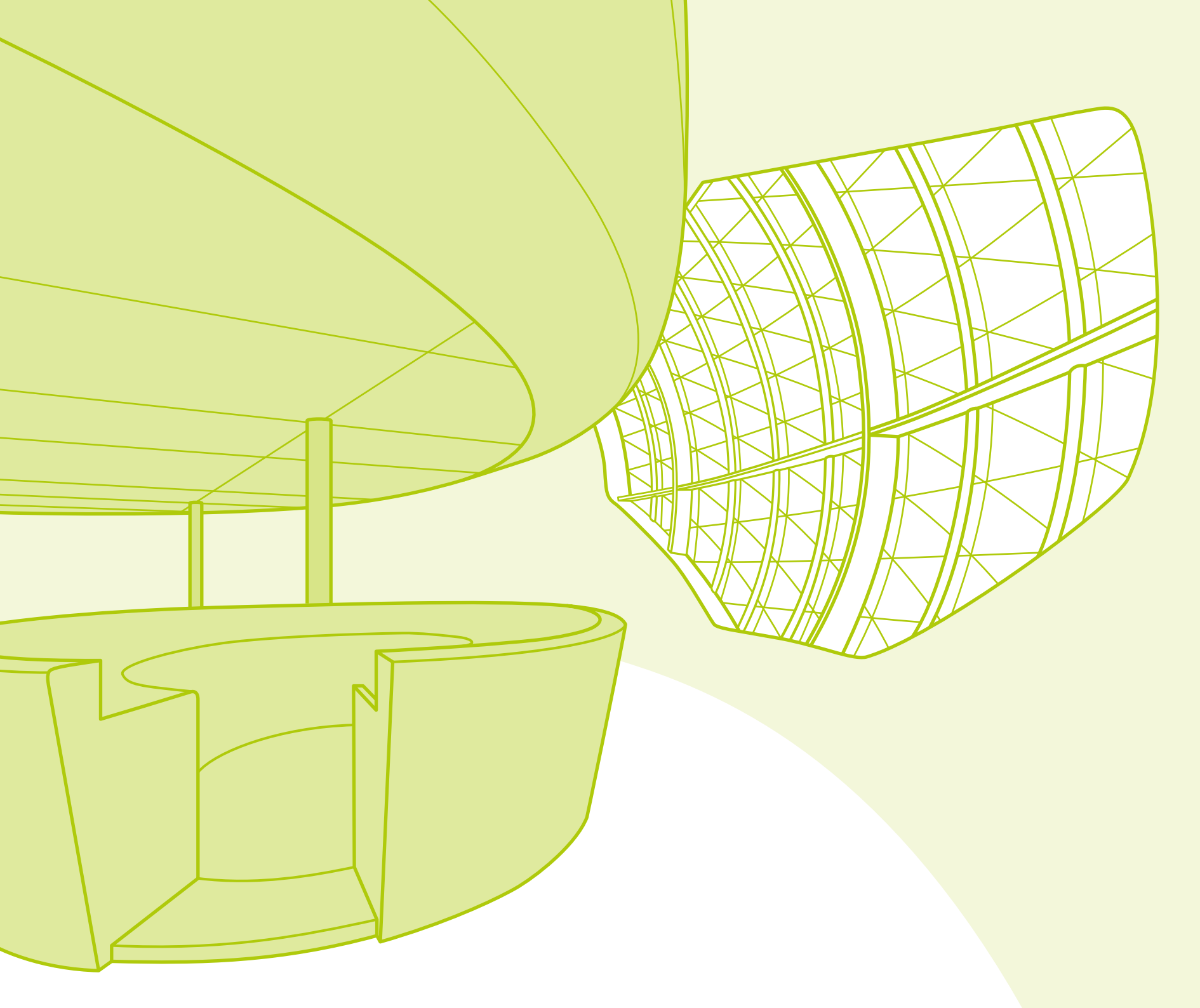
The architect has conceived the most sustainable building as possible in terms of construction methods and the use of certified materials certification. The choice of a traditional product ceramic to finish the facade was quite deliberate. Koninklijke Tichelaar Makkum, this is a secular craft product which has been incorporated in a new way in the façade. The extension meets all the required criteria of sustainable new buildings: an envelope highly isolated, low energy lighting, a system with heat air recovering, floor heating by low temperature and great opening to the light of day in the north.

The plasterboard met the goals regarding sustainable development: they had to be transported within 50 km and were made exclusively with plaster and paper, materials that could be recycled to the infinity.

FLEXIBILITY OF PLASTERBOARDS

The curved walls volumes were performed by Griemink Klazienaveen BV with flexible Siniat plasterboards. «The result is very successful» ensures Bierman Henket architect. «The surfaces are perfectly smooth and curved." Thanks to the work made by HaBoVo Afbouwgroep of IJsselmuide (Netherlands).





Case study #06 I *Ensuring the Cultural Heritage of Historical Buildings*

Preserving and transmitting cultural objects, historical and cultural values

Locality:
Paris (France)

Type:
Historical building renovation

Developer:
City of Paris

Contractor:
DBS – Filiale de SPIE Partesia

Architect:
Studio Milou Architecture
Jean-François Milou

Acoustic engineer:
Peutz
Stéphane Mercier
Maud Serra

Economist:
Bureau Michel Forgue
Michel Forgue et
Jean-Yves André

Photographer:
Fernando Javier Urquijo

Technical support:
Siniat France

LE CARREAU DU TEMPLE, RENOVATION OF AN 18TH CENTURY PARISIAN SILK MARKET

This old silk and rugs market, classified in 1982 as a Historical Monument, has today a new look.

In 2001 the mayor of Paris, Bertrand Delanoë, expressed his willingness to fully restore the building as a rare example of Parisian metal architecture of the 19th century. A contest of ideas was launched in 2003 and an architectural competition was launched in 2007. The project was entrusted to the agency Studio Milou Architecture led by architect Jean-François Milou.

Today the renovated building includes facilities for mixed use and multipurpose areas:

- **A cultural centre** (auditorium, dance hall, music studios)
- **A sports centre** (dance hall, a dojo and fitness area)
- **A business & event area** (multipurpose space, exhibition area)

Started in late 2010, the work under the direction of Thomas Rouyrre, project manager at Studio Milou Architecture included 8 months of archaeological excavations. The refurbishment has taken into account the construction standards of the 21st century, while respecting the historical heritage.

In the spirit of historical restoration, DBS spent 12 months installing 17,000 m² of plasterboard from January 2013. Close collaboration between contractor and construction product manufacturer enabled them to meet the demanding technical specifications and acoustic demands of the project.

Today the renovated building includes facilities for mixed use...

Case study #07 I *Promoting a healthy indoor climate*

Ceiling tiles and plasterboard helped create a healthy indoor environment

Locality:
United Kingdom - Kettering

Type:
Healthcare Renovation

Contractor:
Balfour Beatty

Building owner:
Northamptonshire Healthcare NHS Foundation Trust

Saint-Gobain Team:
Paul Campbell, Commercial Sector manager, British Gypsum

THE CHALLENGE

When faced with the challenge of developing an interior that is as conducive to patient recovery as possible, main contractor, Balfour Beatty, made air quality one of its key considerations.

THE SOLUTION

Balfour Beatty chose a solution, a system containing the manufacturer's innovative technology alongside a range of interior lining systems to meet the hospitals acoustic and impact resistance requirements.

This technology absorbs volatile organic compounds (VOCs), which are harmful pollutants found in the air and converts them into harmless, inert compounds, preventing their re-emission back into the atmosphere. This technology performs for more than 50 years, which is longer than the intended design life of most healthcare interiors.

The ceiling range with this technology was installed in four key areas of the existing hospital building as a retrofit measure. The lead nurse office, corridor areas and memory assessment services office were used to test the success of the products in-situ, providing Balfour Beatty with sufficient data to demonstrate the performance of the technology. Another benefit of this testing phase was that it allowed the client to choose preferred ceiling designs from the comprehensive range.

The effectiveness of this technology has been tested by the accredited Eurofins laboratory. The test shows that this technology decomposes up to 70% of the formaldehyde in a controlled test environment.

The test shows this technology decomposes up to 70% of the formaldehyde in a controlled test environment. The St. Mary's hospital project tests showed that, following the installation of ceiling and plasterboard products, there was an average reduction of 42% in levels of formaldehyde, a common VOC which is linked to health issues in high concentrations. Measurements taken in rooms without this technology showed significantly higher formaldehyde levels, in comparison to the same rooms with this technology installed. All results were well below the maximum level recommended by the World Health Organisation of 0.08ppm.

...main contractor, Balfour Beatty, made air quality one of its key considerations

What about Sustainable Renovation?

Sustainable renovation is an abbreviation of "renovation for sustainable development", it indicates a renovation process that is meant to renovate buildings with care for the architectural, cultural and social qualities; at the same time it considers the impact on the natural environment, and on people's health and comfort.

In line with the reasons leading to renovation, key elements for sustainable renovation are:

ENVIRONMENT

Optimisation of the environmental impacts of a building including:

- Energy savings;
- Water savings and water waste treatment;
- Sorting and recycling of waste stemming from renovation;
- Improving the outdoor environment and biological diversity, rainwater treatment.

SOCIAL AND HEALTH

Provide good and affordable buildings:

- Accessibility for disabled and elderly people;
- Comfort and security;
- Promoting a healthy indoor climate, reduction of harmful materials.

CULTURAL AND HISTORICAL

- Preserving and maintaining cultural objects, historical and cultural values;
- Upgrading buildings and places while respecting their character;
- Innovating while preserving the old.

ECONOMIC

- Prolong the use of existing resources;
- Maintain and enhance real estate values of the property;
- Safeguard the affordability of dwellings.

EUROGYPSUM

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