BUS GoCircular

Shaping a Circular Sustainable Future

Module 4

Upgrades and Maintenance for Sustainability in the Design and Construction Industry

Circular Economy in the Construction Industry

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Summery

Within this module trainees will explore the possibilities and opportunities of Retrofits, Upgrades, Repairs and Maintenance as well as the barriers that exist within these. Following this exploration of how each of these topics can be rolled out within their profession they will go on to look at how this then relates to Multi-functional Green Roofs Facades and Interiors Elements and what these models may look like in relation to this.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Objectives/Learning Outcomes

- 11 – Provide repair services or maintenance services for multifunctional green roofs, façades, and interior elements
- 12 - Provide upgrade programs or upgrade services for roofs and façades
- 13 - Provide DIY repair kits or spare part programs for enabling self-repair of roofs, façades or inner walls.
- 30 - Design multifunctional green roofs, façades, and interior elements that make repair accessible
- 31 - Design multifunctional green roofs, façades, and interior elements that can serve a long and useful life, as well as stay relevant to residents and users

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Objectives/Learning Outcomes

- 42 - Provide building components (e.g. façades, technical installations on roof, partition walls) as a service instead of as a product
- 43 - Offer maintenance and repair services for multifunctional green roofs, façades, and interior elements with help of service business models
- 44 - Offer different leasing and rental models to provide access rather than ownership
- 45 - Incentivise the renovation of roofs with a potential of applying multifunctionality
- 62 - Construct multifunctional green roofs, façades, and interior elements according to service business model

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Objectives/Learning Outcomes

- 64 - Maintain and repair multifunctional green roofs, façades, and interior elements in order to maximise lifetime
- 66 - Rebuild existing (parts of) multifunctional green roofs, façades, and interior elements for a new purpose
- 69 - Construct multifunctional green roofs, façades, or interior elements on site
- 72 - Renovate buildings with the use of multifunctional green roofs, façades, or interior elements to extend lifetime of current building stock

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Content

- Repairs and Maintenance
- Upgrades and Retrofits
- nZEB, Passive Houses and Environmental Certification Schemes
- Sustainable Neighbourhoods
- Upgrades and Maintenance for Multi-functional Green Roofs Facades and Interior Elements

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Repairs and Maintenance

Presentation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Repairs and Maintenance

Repair

- Restore (something damaged, faulty, or worn) to a good condition.

Maintenance

- The process of preserving a condition or situation or the state of being preserved.

Source: https://languages.oup.com/google-dictionary-en/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Types of Building Repairs and Maintenance

- Day to day repairs service facilities
- Annual repairs
- Specialist repairs

Source: https://theconstructor.org/building/building-repair-maintenance-service-types/6903/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Day to Day Repairs

Facilities require a certain amount of upkeep to look their best, maintain a safe environment and serve their intended function.

In an industrial setting, the maintenance worker might have a set schedule of routine maintenance procedures to perform on machinery and equipment.

Source: https://buildinglinkau.com.au/how-to-improve-building-maintenance-quality-while-lowering-costs/

Source: https://theconstructor.org/building/building-repair-maintenance-service-types/6903/
https://www.remdal.com/blog/4-common-types-building-repair-maintenance-services/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Day to Day Repairs

Day to day repairs include service repairs which arises from time to time in the services of the buildings such as in plumbing works, water supply, etc. Examples for such repairs are

- removing chokage of drainage pipes
- manholes
- restoration of water supply
- replacement of blown fuses
- repairs to faulty switches
- watering of plants
- lawn mowing
- hedge cutting
- sweeping of leaf falls

Source: https://theconstructor.org/building/building-repair-maintenance-service-types/6903/
https://www.remdal.com/blog/4-common-types-building-repair-maintenance-services/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Annual Repairs

This maintenance service is carried out to maintain the aesthetics of buildings and services as well as to preserve their life, some works like white washing, distempering, painting, cleaning of lines, tanks etc. are carried out periodically. These works are planned on year to year basis.

Image source: Google images

Source: https://theconstructor.org/building/building-repair-maintenance-service-types/6903/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Specialist Repairs

- Maintenance of Electrical Installations
  - Electrical equipment must be maintained and repaired frequently for optimal operations and safety.
  - Records should be kept for all maintenance and repair work.
- Prevention Measures
  - Measures such as painting, periodic check ups and protection against flooding can all help reduce the need for repairs in the future.
  - Reduced and proper usage can also help to reduce the need for repairs in the future and can have a positive impact on a buildings lifespan.

Source: https://www.remdal.com/blog/4-common-types-building-repair-maintenance-services/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Specialist Repairs

- Repair and Maintenance Schemes
  - Repair and maintenance schemes are often offered by suppliers and can help to further the lifespan of a product.
  - Buying into schemes such as Product-as-a-Service schemes can also ensure the lifespan of a product is extended.

Source: https://www.remdal.com/blog/4-common-types-building-repair-maintenance-services/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Right to Repair

Issues with repairing products

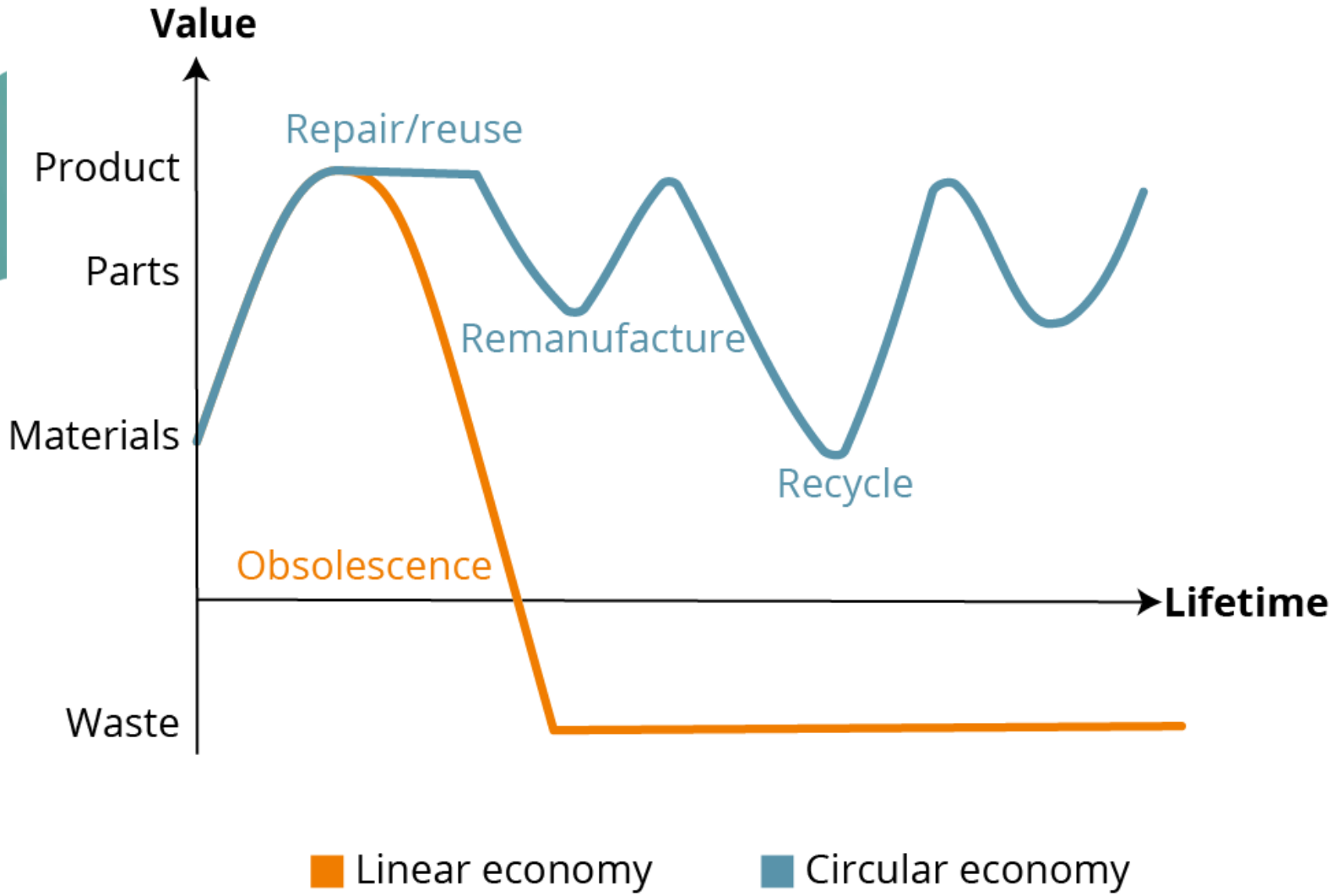
- Repairs can be costly
- Difficult to arrange for lack of spare parts
- Products tend to break down faster if pay to repair
- Consumers keep a product longer disincentivizing manufacturers

What the right to repair means

- Repair is seen as an important element of a circular economy
- Slow down the use of resources and the flow of materials
- Fewer greenhouse gas emissions and less waste
- Essential for the uptake of second-hand and refurbished products
- Can potentially generate local jobs in small and medium-sized enterprises

Source: https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698869/EPRS_BRI(2022)698869_EN.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740



Illustrative indication of a circular economy versus a linear economy for electronics

Source: https://www.eea.europa.eu/publications/europe2019s-consumption-in-a-circular/benefits-of-longer-lasting-electronics

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

What is the 'right to repair'?

The Right to Repair campaign was launched in September 2019, and quickly grew since to over 100 organisations active around the cause of repair in more than 20 European countries.

The problem is simple. The products we use everyday are getting harder and harder to repair. E-waste is one of the fastest growing waste streams in the world, with phone and laptops manufacturers making their products harder to fix. And it’s not just digital devices – the amount of household appliances failing within 5 years of their purchase is also skyrocketing.

Image source: Google images

Source: https://repair.eu/about/

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101033740

What is the 'right to repair'?

- **The right to repair during the guarantee period.** EU consumers have a right to have faulty products repaired free of charge during the legal guarantee period. Under EU law, this is two years from the moment they bought the product. However, a presumption that the product was faulty from the start (in other words, that there is no fault on the part of the consumer) is only valid during the first 12 months. Moreover, while sellers are required to repair, replace or reimburse products that break down due to non-conformity, they are not required to repair defects occurring for other reasons, e.g. if a product was dropped or used improperly.

Source: https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698869/EPRS_BRI(2022)698869_EN.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

What is the 'right to repair'?

- **The right to repair after the legal guarantee has expired.** Once the legal guarantee has expired, neither sellers nor manufacturers are required to repair the products. Consumers no longer have a right to have their products repaired, even if they want to pay for the repair themselves. They are thus often faced with a situation in which repair would cost too much (compared with buying a new product); spare parts are not available; there are no repair shops left in their vicinity; or products are made in such a way that they cannot be repaired (e.g. because parts are glued together or are inaccessible).

Source: https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698869/EPRS_BRI(2022)698869_EN.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

What is the 'right to repair'?

- **The right for consumers to repair products by themselves** (as opposed to being required to use the official repair shops). 3 Under EU law, manufacturers are not required to provide technical information (such as manuals and service handbooks) to consumers, nor are they required to provide consumers with spare parts.4 Only professional repairers have a guaranteed right to access the technical information and the spare parts, and only for some products.

Source: https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698869/EPRS_BRI(2022)698869_EN.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Repair and Maintenance Manuals

A repair and maintenance document can be created and shared by the design and construction team for the owner and operator.

Sections can include

- General information
- Operational instructions and procedures
- Maintenance and repair procedures
- Modifications
- Project warranties and guarantees

Shown here is one example of a template to use

https://methodstatementhq.com/building-operation-maintenance-manual-template-in-word-format.html

Source: https://methodstatementhq.com/building-operation-maintenance-manual-template-in-word-format.html

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Upgrades and Retrofits

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Upgrades and Retrofits

Upgrade

- Raise (something) to a higher standard, in particular improve (equipment or machinery) by adding or replacing components.

Retrofit

- Add (a component or accessory) to something that did not have it when manufactured.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Why Upgrade?

Incorporating the right high-performance measures into your building can drive efficiency and cost savings while also increasing occupant productivity and improving health and satisfaction. In short, it's just good business.

Focus points:

- Energy and Water Efficiency
- Indoor Environmental Quality
- Sustainable Sites and Transportation

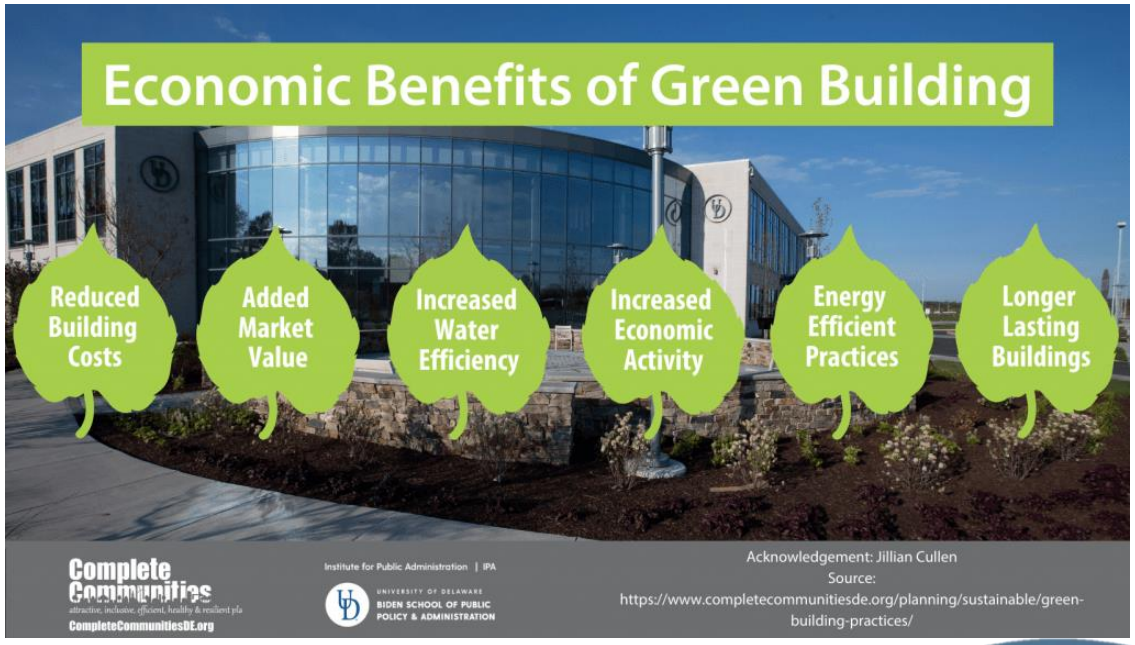


Image source: https://www.completecommunitiesde.org/planning/sustainable/green-building-practices/

Source: https://sftool.gov/plan/upgrades

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Energy and CO2 Saving Potential

Individual retrofits can produce big savings versus baseline business-as-usual energy use, depending on the building types. Existing examples include:

- Detached single-family homes cutting total energy use by 50-70%
- Multi-family housing reducing space heating requirements by 80-90% and, in developing countries, cutting cooling energy use by 30% and heating energy by 60%
- Commercial building HVAC energy use reduced by 25-50% and by 30-60% for lighting

Source: Fit-to-NZEB: Ecology & Sustainability

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

What is a Deep Retrofit?

The Deep Retrofit of a home means carrying out multiple energy upgrades all at once to achieve a BER of A-rating.

- Firstly, you will need to reduce the level of heat loss so that you keep heat in the home for longer. This involves some or all of the following: wall insulation, roof insulation, floor insulation, window upgrades.
- The next step is to look at an efficient renewable heating system to support the transition away from fossil fuels. The typical heating system installed on a Deep Retrofit Pilot Project is an air-source heat pump.
- It also includes mechanical ventilation to maintain good indoor air quality.
- Other renewable energy technologies such as solar water heating panels and solar photovoltaic panels may be appropriate for your home.

Source: https://www.seai.ie/grants/home-energy-grants/deep-retrofit-grant/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Types of Retrofits

- Adaptive reuse
  - Repurposing buildings that is the sustainable way to meet new needs and purposes.
- Expansive reuse
  - Upgrade and add new space to existing buildings in creative ways, to maximise their value. Creating new basements or adding storeys to an existing building can deliver transformative outcomes.
- Proactive reuse
  - When buildings require repairs, upgrades can unlock new possibilities.

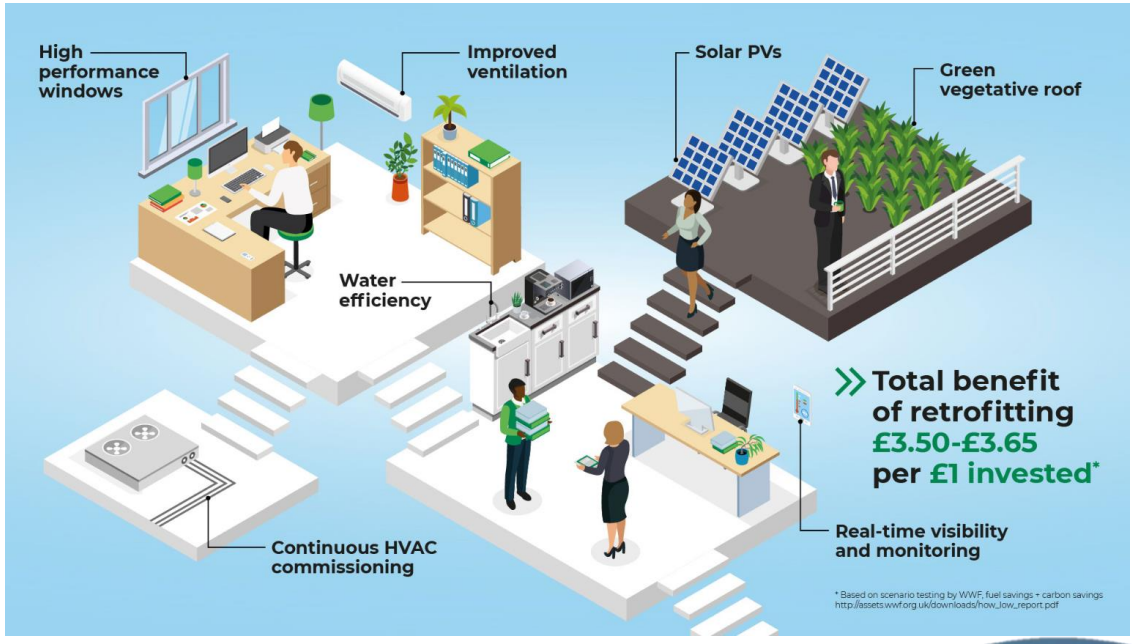


Image source: https://www.ft.com/partnercontent/lloyds-bank/building-a-sustainable-future.html

Source: https://www.arup.com/services/buildings/building-retrofit

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Step by Step Retrofit

Types of step-by-step retrofit processes

- **Sequential retrofitting of building components:** i.e. Step 1 consist of the wall insulation; in Step 2, the windows will be replaced and a ventilation system is installed; and in Step 3, the roof insulation, the heating system and other measures are implemented.

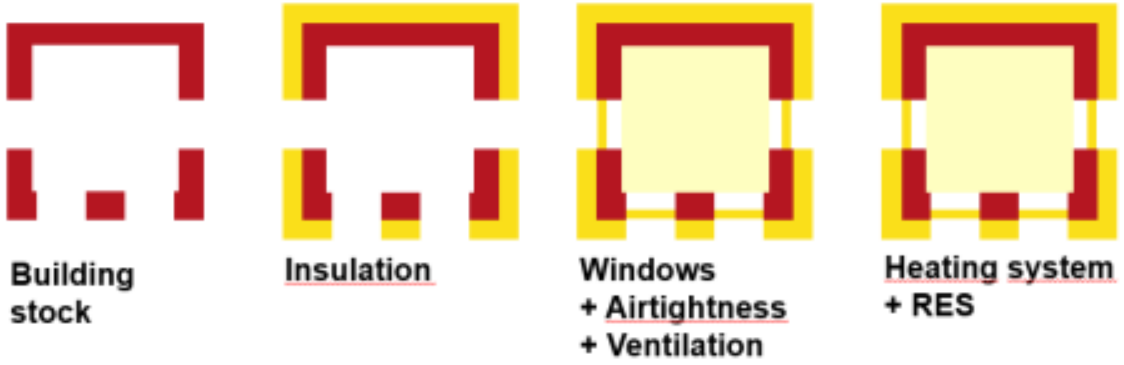


*Image: **Sequential retrofitting of building components***

*Source:*https://passipedia.org/planning/refurbishment_with_passive_house_components/overall_retrofit_plan_for_step-by-step_retrofits_to_enerphit_standard

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Step by Step Retrofit

Types of step-by-step retrofit processes

- **Sequential retrofitting of building parts or sections**: i.e. a refurbishment of single building wings, apartments, new extensions or terraced houses. Even the retrofit of single sides of a building only can be envisaged.

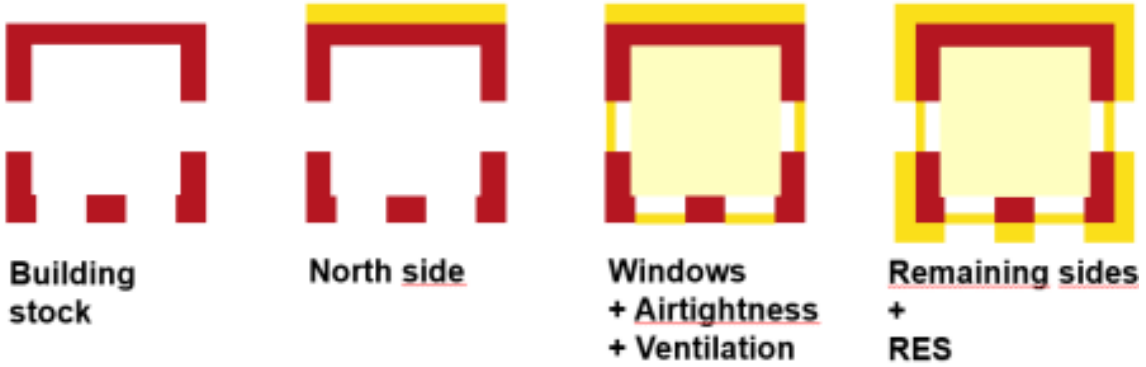


*Image: **Sequential retrofitting of building parts or sections***

Source: https://passipedia.org/planning/refurbishment_with_passive_house_components/overall_retrofit_plan_for_step-by-step_retrofits_to_enerphit_standard

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

More Information on a Step-by-step Retrofit

https://europhit.eu/sites/europhit.eu/files/EuroPHit_Handbook_final_Optimized.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Drive 0 Project

We want to accelerate deep renovation processes by enhancing a consumer centered circular renovation process in order to make deep renovation environmentally friendly, cost effective and more attractive for consumers and investors.

“A circular deep renovation, which contributes to a circular built environment’, is based on 100% life cycle renewable energy, and all materials used within the system boundaries are part of infinite technical or biological cycles with lowest quality loss as possible.”

Source: https://www.drive0.eu/

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101033740

Drive 0 - Case Study Estonia

The aim of the project was to renovate the apartment building in the most optimal way possible, in a short period of time, and by choosing materials still reusable after the end of the building life cycle. In addition, Timbeco used as many products and materials of domestic origin as possible, and reused some of the materials generated during the renovation process.

Source: https://timbeco.ee/keskkond-jatkusuutlikkus/

Source: https://www.drive0.eu/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Drive 0 - Case Study Estonia

These modules can be used to fully renovate many of the typical apartment buildings constructed in Estonia before the 1990s, many of which can also be found in other countries in Scandinavia and Central Europe. All these multi-apartment buildings have quite similar problems: high energy consumption levels, poor ventilation and indoor climate, and uneven indoor temperatures. Many apartment associations have plans to renovate their buildings. The Drive 0 pilot building shows that renovations can be done conveniently and efficiently.

Source: https://www.drive0.eu/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

nZEB, Passive Houses and Environmental Certification Schemes

Presentation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

nZEB and Passive Houses

nZEB

- Nearly Zero Energy Buildings' means a building that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby

Source: https://www.bpcventilation.ie/blog/nearly-zero-energy-buildings/

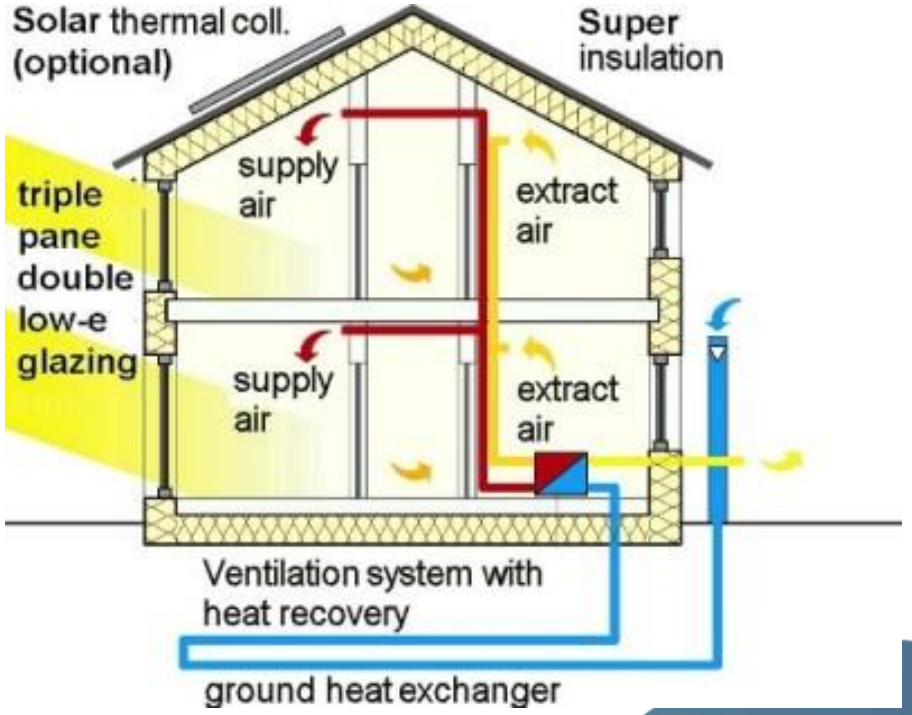
Source: nZEB Fundamentals BIMzeED https://mmccarchitects.com/what-is-a-passive-house/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

nZEB and Passive Houses

Passive House

- The Passive House or PassivHaus standard was developed in Germany as a ‘fabric first’ approach to minimise the energy requirements and running cost of a building.Passive House is a precise building standard and quality assurance system to ensure that there is little to no performance gap, unlike the building regulations. It is a highly flexible system that can accommodate most styles of architecture and construction methods. Ideally, it should be approached holistically within the design process at an early stage.



Source: https://passipedia.org/basics/what_is_a_passive_house

Source: nZEB Fundamentals BIMzeED https://mmccarchitects.com/what-is-a-passive-house/

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101033740

Key Passive House Principles

- Highly insulated
- Excellent Airtightness
- Addressing thermal bridging
- High quality triple glazed windows & doors
- Mechanical Heat Recovery Ventilation (MHRV)

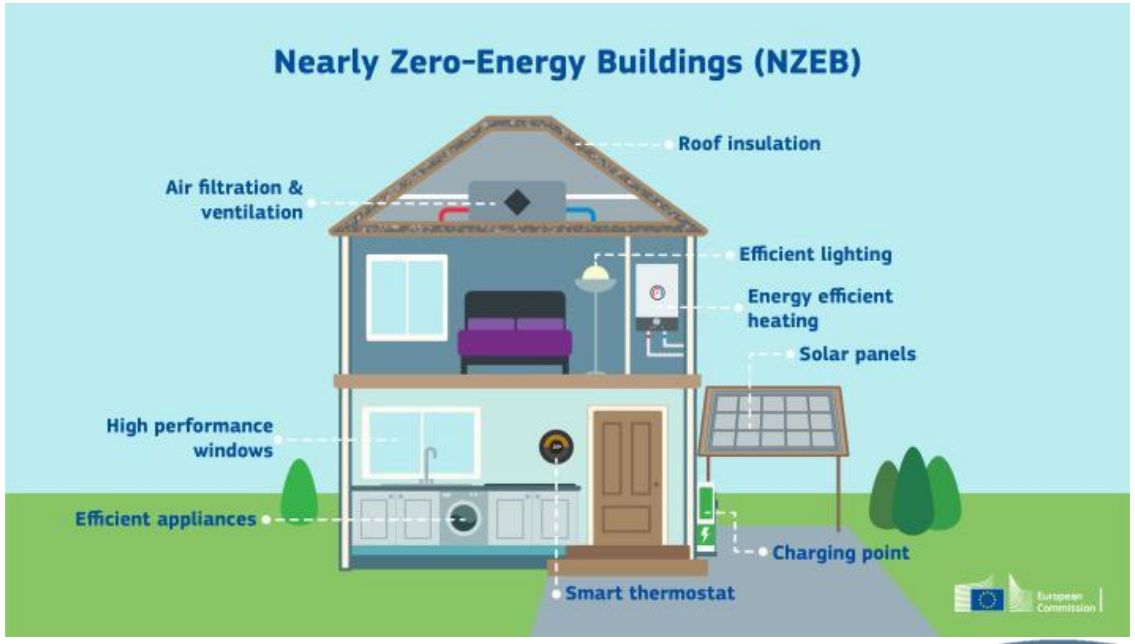
Press play on video or go to - https://www.youtube.com/watch?v=sWccxmQvR0o&t=2s

Source: https://mmccarchitects.com/what-is-a-passive-house/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Nearly Zero-Energy Buildings

Nearly zero-emission building (NZEB) means a building that has a very high energy performance, while the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.



Source: https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/nearly-zero-energy-buildings_en

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

nZEB and Passive Houses

Since energy efficiency consists in reduction of consumption and reduction of greenhouse gas emissions, the Passive House standard has emerged as a key enabler for the Nearly Zero Energy Building standard. The combination of PH with renewables represents a suitable solution to move to low/zero carbon.

A passive house is designed to have an energy demand that is as low as practically achievable. With such a small amount of energy to be supplied, it is easier to meet the subsequent demand by renewable sources

Source: https://phai.ie/info/passive-house-nearly-zero-energy-buildings/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Environmental Certification Schemes

Considering the variety of objectives, strategies and practical approaches of sustainable development at different areas:

- LEED (Leadership in Energy and Environmental Design)
- Breeam (Building Research Establishment Environmental Assessment Method)
- DGNB (Deutsche Gesellschaft Fur Nachhaltiges Bauen)
- Green Star - Australia
- HQE (Haute Qualité Environnementale) - France, Brazil, Canada
- Ska Rating - developed by RICS
- CASBEE (Comprehensive Assessment System for Built Environment Efficiency - Urban environment) - Japan

Source: Fit-to-NZEB: Ecology & Sustainability

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

LEED

LEED (Leadership in Energy and Environmental Design) is a voluntary rating system to certify sustainable buildings and neighbourhoods. Launched by the US Green Building Council in 1998, LEED has been gaining traction around the world – in fact 1 of every 3 LEED projects is outside the United States. According to USGBC, there are more than 100 certified projects in Ireland, of which 60% achieved the certification in the past two years. (Data: USGBC, March 2020.)

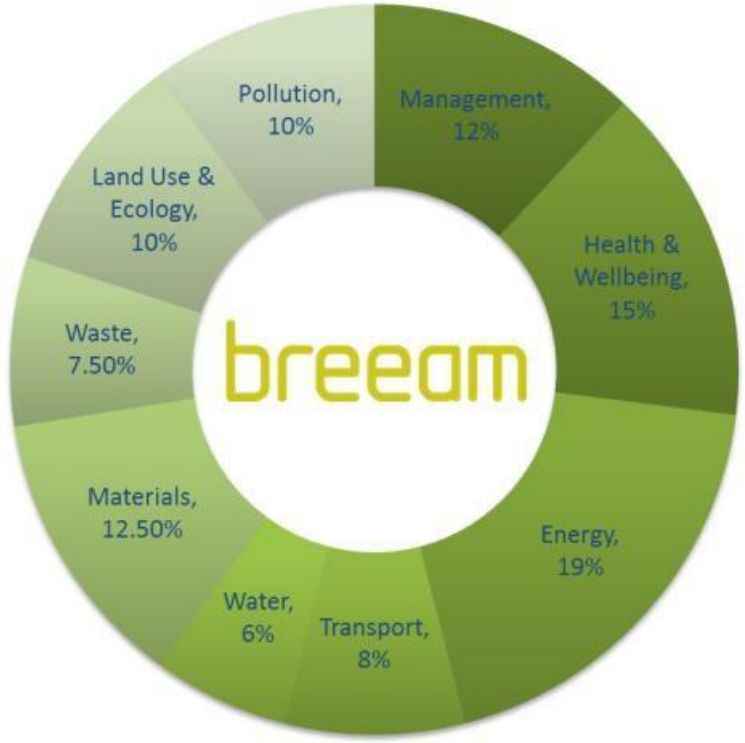
Source: https://www.igbc.ie/certification/leed/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

BREEAM

The world's leading science-based suite of validation and certification systems for a sustainable built environment.

Since 1990, BREEAM's third-party certified standards have helped improve asset performance at every stage, from design through construction, to use and refurbishment. Millions of buildings across the world are registered to work towards BREEAM's holistic approach to achieve Environmental, social, and corporate governance (ESG), health, and net zero goals. It is owned by BRE – a profit-for-purpose organisation with over 100 years of building science and research background.



Source: https://www.volkerfitzpatrick.co.uk/en/corporate-responsibility/environment/breeam-capability

Source: https://bregroup.com/products/breeam/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Environmental Certification Schemes

- **Criterion**: states the main specifications and details of the determined objectives (i.e. objectives and aspects of sustainable urban development).
- **Indicator**: quantitative and measurable description of the criteria. Each criterion might be evaluated by a number of indicators.
- **Rating system**: shows the specific boundaries of classification and the evaluation method (quantities of qualitative) for indiatore measurement; the criteria importance factor; and the minimum level of requirement.
- **Certification process**: decides the necessary measures and the steps to award the certificate.

Source: Fit-to-NZEB: Ecology & Sustainability

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Sustainable Neighbourhoods

Presentation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Sustainable Neighbourhoods

“Sustainable cities and communities” start with sustainable neighbourhoods.

It is in neighbourhoods where people can easily meet their daily needs, socialize, and feel safe. This requires high-quality urban landscapes and open spaces, sustainably designed housing, shopping and recreation, access to schools, childcare facilities, and other services. At the same time, each neighbourhood needs good transport links to the places where people need to go, whether it is for work or pleasure.

United Nations Environmental Programme

INTEGRATED GUIDELINES FOR SUSTAINABLE NEIGHBOURHOOD DESIGN

https://www.neighbourhoodguidelines.org/

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101033740

Sustainable Neighbourhoods - Energy Reduction

A sustainable neighbourhood is a healthy, safe and resilient place to live, work and play. Sustainable neighbourhoods:

- Have accessible, diverse and healthy green spaces
- Encourage water and energy efficiency
- Manage rain where it falls
- Promote healthy living and active transportation
- Foster a connected community engaged in stewardship and climate action

To fully implement designers must work with municipal partners, residents, businesses, schools and community groups to develop and implement plans for environmental improvement, urban renewal, community engagement and climate change resilience.

Source: https://cvc.ca/sustainable-neighbourhoods/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

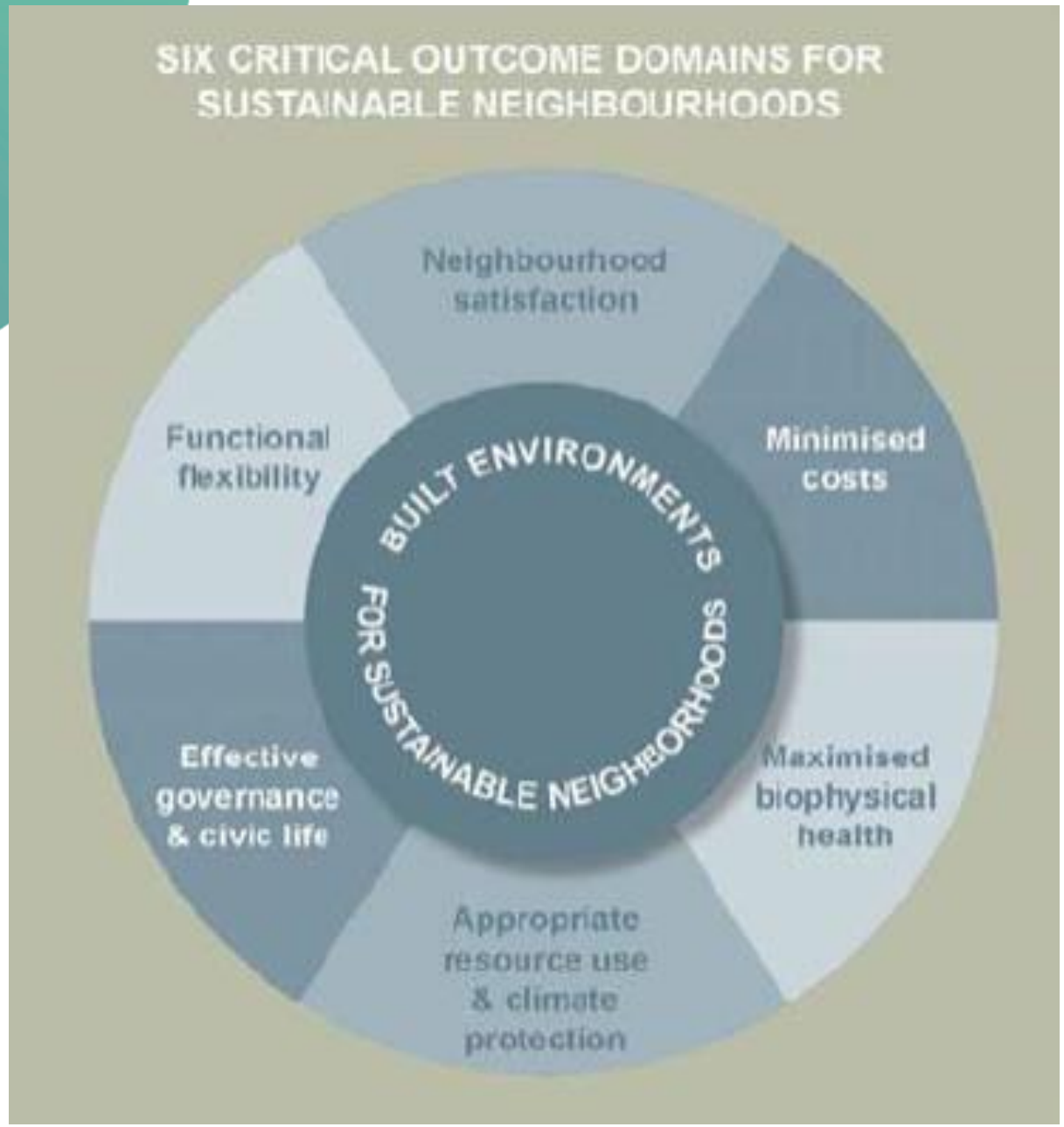


Image:https://www.researchgate.net/figure/Six-critical-outcome-domains-for-sustainable-neighbourhoods_fig1_237338703

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Sustainable Neighbourhoods Criteria and its relation to Circular Economy and Construction

Potentialities of the location and of the project

- Transport services
- Diversity of functions
- Build density

Use of resources

- Access to sun and light
- Heating requirements and energy
- Materials

Green Spaces

- Soil sealing: Permeable surface
- Rainwater collection
- Green spaces, plants and biodiversity

Source: Criteria from the handbook “Towards sustainable neighbourhoods” by the Research Centre on Territorial, Urban and Rural Sciences (Lepur) of the University of Liége, at the request of the Walloon Minister of the Environment, Spatial Planning and Mobility (Belgium).

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101033740

Sustainable Neighbourhoods Criteria and its relation to Circular Economy and Construction

Amenities of the neighbourhoods

- Roads and links with the surroundings
- Parking (car and bicycle)
- Architecture and image of the neighbourhood and heritage of the neighbourhoods
- Collective equipment
- Waste management

Social aspects and public participation

- Diversity of uses
- Diversity of dwellings
- Social housing
- Access to handicapped people
- Community involvement

Source: Criteria from the handbook “Towards sustainable neighbourhoods” by the Research Centre on Territorial, Urban and Rural Sciences (Lepur) of the University of Liége, at the request of the Walloon Minister of the Environment, Spatial Planning and Mobility (Belgium).

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 101033740

Upgrades and Maintenance for Multi-functional Green Roofs Facades and Interior Elements

Presentation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Upgrades and Maintenance for Multi-functional Green Roofs Facades and Interior Elements

- Case Study
- Repairs and Maintenance
- Upgrades and Retrofits
- Impact on Other Sustainable Building Practices

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Case Study - Munich Technology Centre, Munich

The Munich Technology Centre (MTZ) has a 2,500 m² roof it was decided to use a photovoltaic system combined with an extensive green roof. The individual frames for the solar system were each mounted on a 1 × 2 meter Solar Base Plate SB 200 and covered with substrate. Because the solar panels were set up almost to the edge of the roof the additional fixing device Fallnet® SB 200 Rail was installed which allows for safe working in the perimeter areas.

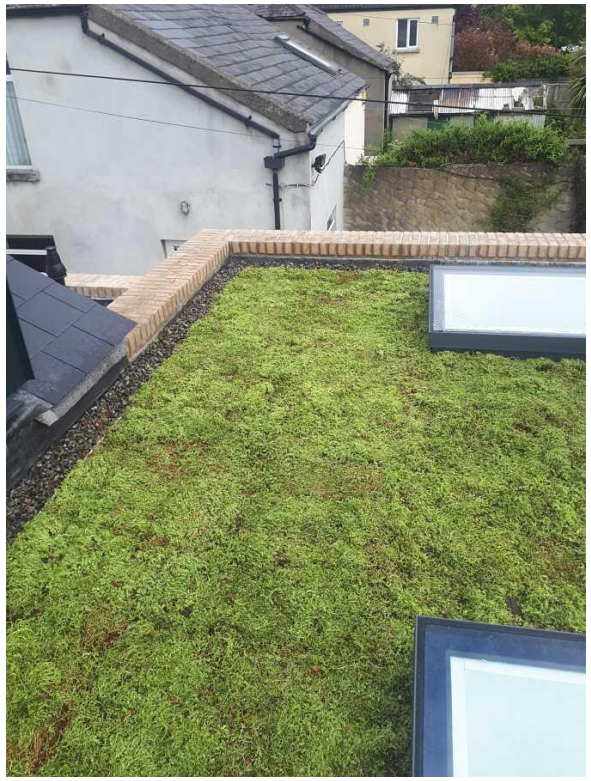
Source: https://zinco-greenroof.com/references/munich-technology-centre-munich

Source: https://zinco-greenroof.com/references/munich-technology-centre-munich

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Maintenance on a MGRFIE

Intensive Green Roofs will require regular maintenance. Lawns will require mowing weekly or fortnightly, plant beds may require weeding on a weekly or fortnightly basis during the growing season, and wildflower meadows may require annual mowing with the cuttings removed.



Source: https://laydex.ie/news-blog/about-sedum-green-roof/

Source: https://www.dlrcoco.ie/sites/default/files/atoms/files/appendix16.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Maintenance on a MGRFIE

Extensive Green Roofs should normally only require bi-annual or annual visits to 1 As calculated by Klooster et al. (2008)

- 7 remove litter
- check fire breaks and
- drains and
- in some cases remove unwanted colonising plants

The highest maintenance regime is generally required in the first three years, and usually this should be made the responsibility of the Green Roof provider (Source: CIRIA C697).

Source: https://www.dlrcoco.ie/sites/default/files/atoms/files/appendix16.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Maintenance on a MGRFIE

Intensive Green Roofs need to be watered and weeded in the same way as you would a normal garden.

Larger plants, shrubs and trees should be pruned to make sure they are safe during windy conditions.

Drains and gutters should also be checked and cleared to avoid blockages.

Source: https://www.urbangreenbluegrids.com/measures/green-roofs/intensive-green-roofs/

Source: *https://www.dlrcoco.ie/sites/default/files/atoms/files/appendix16.pdf*

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Accessibility for Maintenance

Easy access for maintenance of green roofs should be provided in the building. The maintenance staff often encounters difficulty in maintaining the roofs especially when the roofs are not designed for building occupant access. Weeds are a persistent problem, especially during the establishment period. It is a problem to dispose of the weeds if the roof does not have an easy access.

Source: https://architizer.com/blog/inspiration/collections/roof-scapes/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Advantages of Upgrades for MGRFIE

Manage Stormwater

- Most green roofing systems are designed to accommodate at least 1 inch of stormwater before discharging excess water to the storm drains. Instead of immediately getting rid of this valuable asset, we are able to use the stormwater to water the green roof.

Minimize the Urban Heat Island Effect

- Urban heat islands are described as the phenomenon that urban areas have a greater ambient temperature than the surrounding rural areas.

Extend Roof Membrane Lifespan

- Green roofs can also help extend the life of a roofing membrane.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Impact on Other Sustainable Building Practices

Green roofs can have a positive on other sustainable building practices such as passive houses and nZEB. This can benefit buildings through things such as improved insulation, space for sustainable energy and water collection and products and protect the building components such as membranes from weather damage.

What are some other benefits that align to sustainable practices you undertake?

Source: https://www.renewableenergyworld.com/baseload/copenhagens-fourfold-path-to-carbon-neutrality/#gref

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

QUIZ/ASSIGNMENT/ACTIVITY

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

EXTRA READING/STUDY

Activity

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

EXTRA READING/STUDY

For Further Case Studies and Training Material Please Follow the Link Below

https://docs.google.com/spreadsheets/d/1DTte4Ph8pQ4lKzYGFt2_S-d1Z_Rmd9-i/edit?usp=sharing&ouid=112148808974461842163&rtpof=true&sd=true

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

EXTRA READING/STUDY

Building Upgrades

https://www.energystar.gov/buildings/save_energy_commercial_buildings/ways_save/building_upgrades

BIMzeED

https://bimzeed.eu/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

https://busgocircular.eu/

Follow us

https://twitter.com/BusGoCircular

https://www.linkedin.com/company/busgocircular

https://www.youtube.com/channel/UCXu4Rjs5WDXBE-yqda5kt5A

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740

Colophon

BUS GoCircular

Partners

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033740