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# BUILDINGS:
# CONTRIBUTION TO RECOVERY AND THE RENOVATION WAVE IN EUROPE

## INTRODUCTION

As the global COVID-19 pandemic continues to unfold, plans for recovery and the future are now set in place. These plans need to turn the challenges of today into the opportunities of tomorrow. Recovery must be focused on building a more competitive, sustainable and resilient economy that is able to create jobs and enable the transition in the built environment that is human-centric, green and digital.

The NextGenerationEU package offers a once-in-a-generation chance to shape our European economies and societies for the better, to renovate the existing stock of buildings and to make them better places to live and work, whilst being more energy and resource efficient. AIOTI Buildings Group supports the focus on digital and green technologies in the overall EU Recovery Fund package, particularly the Recovery and Resilience Facility, which will bring jobs and economic growth. In order for the recovery funds to make a real, long term impact for the European built environment, there is a need to fulfil the ambition of a carbon-free continent by 2050, backed by the full power of digital technologies.

Decarbonising the EU's building stock through human-centric renovations will support job creation and sustainable growth, driving the economic recovery from the ongoing economic and health crisis. The building sector is the largest energy consumer in Europe, absorbing 40% of the final energy and producing about 36% of all greenhouse emissions[1]. Across Europe, 75% of buildings are considered energy inefficient, and, depending on the Member State, only 0.4-1.2% of the building stock is renovated each year. If Europe is to fulfil its 2050 climate and energy goals, this rate will need to be doubled to reach 3% per year.

## RENOVATION WAVE

Renovation of both public and private buildings has been singled out in the European Green Deal (EGD) as a key initiative to drive energy efficiency, which AIOTI Buildings Group strongly supports. With 97% of EU buildings in need of renovation, we believe that the upcoming legislative proposals under the Renovation Wave Initiative and the EGD represent a unique opportunity to not only ensure the energy efficiency of buildings but also to address the wellbeing, health and comfort of occupants through a better Indoor Environmental Quality (IEQ).

The Renovation Wave is aimed at renovating the existing stock of buildings and making them more energy and resource efficient. This includes public buildings, commercial buildings, social infrastructure and housing, and more generally energy inefficient buildings. The Renovation Wave strategy has the following three broad objectives[2]:

[1] European Commission, Communication from the Commission on the European Green Deal: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN
[2] Recovery and Resilience Plans: https://ec.europa.eu/info/sites/info/files/component_renovation.pdf

- **Jobs and growth** - the renovation wave aims to create local jobs, stimulate local investments, foster the adoption of digital technologies, improve the resilience of the building stock and support SMEs.
- **Green transition** - the renovation wave has the potential to reduce energy consumption compared to a business-as-usual scenario and reduce yearly GHG emissions during the 2021-2026 period, while improving health and environmental performance. It also aims to increase the prevention, reuse and recycling of construction waste, and the uptake of sustainable construction materials to increase resource efficiency and realise climate benefits across the entire life-cycle of buildings.
- **Social resilience** - by providing incentives to renovate the existing stock of buildings, in particular public buildings as well as social infrastructure and housing, energy poverty concerns can be alleviated through reduced energy and water bills, while improving affordability of housing and living conditions.

AIOTI Buildings Group believes that the foundation for an effective and ambitious Renovation Wave must be based on the following three principles:

- **Digitally integrated building renovations:** Boosting digitally integrated renovations for energy efficient, renewable-based and flexible buildings, to attain climate neutrality in the most cost-effective and timely manner. This approach is based on the integration of technologies related to various segments that combined, evolve into smart buildings, enabling the advantages of collaboration and joint platforms benefiting from generated data. Only the integration offers the opportunity for future smart city planning, digital and sustainable building development, smart working & living and the evolution into a 'technological building ecosystem'.

- **Energy Efficiency and Renewables:** in line with the Energy System Integration Strategy and the upcoming Climate Law, energy efficiency and renewable energy sources renewables must be central to all aspects of building renovations. This can be combined with policies that go beyond energy efficiency and promote Indoor Environment Quality (IEQ) to ensure comfort, wellbeing, and productivity benefits to their users. An example of a tool that could achieve both energy savings and higher comfort and wellbeing is the Energy Performance of Buildings Directive's (EPBD) Smart Readiness Indicator, which is currently being applied throughout the EU on a voluntary basis[3].

- **Dedicated financial flows:** it is crucial that each Member State dedicate financing within their National Plans for the EU Recovery and Resilience Facility, and other available funding sources, to increase the rate and quality of renovations of buildings and to support integrated building renovations that will deliver decarbonisation before 2050.

[3] Smart Readiness Indicators: https://smartreadinessindicator.eu/

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## INVESTMENT INTO DIGITAL BUILDINGS

The next breakthrough for energy savings and efficiency in the era of the European Green Deal (EGD), will not come only from more efficient product design. To leap forward in line with the EGD's ambition, the next generation of energy efficiency gains will be delivered by more efficient, smarter product use. Smarter use will be built in at the product level and via products securely connected to others in systems at the building level.

The Recovery and Resilience Facility has provided a push to progress for more structured digitalisation and digital investment. In the context of the Renovation Wave, public finance should not neglect improving a building's smartness from both an energy efficiency and indoor environmental quality perspective. WPI Economics found smart technology fitted to non-domestic buildings could be used to achieve savings of between 5% and 10% of the emissions of all buildings[4]. Ignoring the potential for connectivity use and energy savings could lead to long-term lock-in-effects, postponing the digitalisation of the building stock for decades.

AIOTI Buildings Group encourages EU Member States to **dedicate funding to support and accelerate the transition to sustainability for buildings and communities through digital technologies, in particular by building high quality connectivity infrastructure, developing a digital environment that empowers end-users, encourages the development of skills, and brings long-term growth opportunities to the sector.**

## CASE STUDIES

New disruptive technologies could play an essential role in helping to achieve greater energy efficiency in buildings. The information and control enabled by Internet of Things (IoT) devices are helping create smart buildings that:

- minimise the energy and associated CO2 needed to run assets and operations;
- optimise the performance, efficiency, and lifespan of physical assets;
- ensure the safety, security, and efficiency of people and processes;
- enable monitoring and efficiency related to energy, water, waste, air condition, hygiene (HACCP), fire control & evacuation, and many others; and
- aspire to improve the working and wellbeing conditions of the occupants.

[4] Digital Buildings- How smart technology can decarbonise buildings and combat climate change: https://newscentre.vodafone.co.uk/app/uploads/2020/11/Vodafone-Digital-Buildings-Report-201123-Pages.pdf

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## CASE STUDIES

**The following cases studies** from AIOTI Buildings Group members are examples of how digital solutions can achieve a human-centric, digital and green built environment.

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| **Energy Management**<br><br>Vodafone & IoT.nxt | Enabling energy efficiency through the continuous monitoring of consumer habits and the relevant energy consumption equipment, and through interventions based on the evaluation of data. The solution, which won the 2020 Verdantix Smart Building Innovation Award, provides offices with a desk booking system, movement sensing and environmental monitoring of air quality, lighting and energy use. It provides real time heat maps and analytics helping companies to manage buildings more efficiently as well as insights to help design spaces to better protect and meet occupants' and employees' needs. The key features include:<br>• **Occupancy monitoring** – the system utilises infrared sensors which identify movement based on heat signatures. These sensors create a mesh allowing the movement of individuals and the flow of people to be monitored in real time providing building managers with people count and also the flow of people through spaces. The data is completely anonymous and identities are never used or stored, thus ensuring data privacy.<br>• **Energy monitoring** - consumption data is gathered from sub-meters present in the building for each commodity consumed and then analysed with the aim of providing a complete picture of the building's energy consumption. This offers clear visibility of how much energy is being used and how it is being used at any time of the day which is displayed to create awareness and help influence user behaviour.<br>• **Environmental monitoring** - using sensors, environmental monitoring works to provide real-time data on air quality, temperature, humidity, CO2 and Total Volatile Organic Compound (TVOC). Each of these factors are independently monitored and managed. These sensors are integral to helping prevent harmful effects on the natural environment. |
| **Make buildings and cities greener by digitalisation**<br><br>Siemens | Digital Twins and Building Information Modeling (BIM) for buildings and cities with a consistent and structured data management are an excellent way to make buildings and cities greener by digitalisation. A digital, virtual representation of a physical building or city enables an ecosystem with services and applications – and generates high business value across the lifecycle.<br>• **Singapore has built a €73 million live, digital replica of the entire city. Civil servants can run virtual experiments and test scenarios before policies are implemented[5].**<br>Disputes are recognised as a critical cause of deficiency and low performance in construction projects. With BIM[6] a building is built twice, first virtually then physically, with construction only beginning after the virtual building meets all expectations and specifications. And BIM is an approach to control causes of conflict before the occurrence of dispute. It also creates significant benefits that are realized during the operational phase, which accounts for 80% of the life-cycle cost, until the end of the building's lifespan. All of this will improve profitability and the environmental footprint over the entire building lifecycle and generate measurable advantages for investors, planners, contractors, tenants and operators.<br><br>With BIM combined with a Digital Building Twin, the high goals in reducing the use of raw materials, energy and a sustainable approach to the environment are within reach and enable the achievement of the goals of the "Green Deal" initiative of the European Commission. |
| **Ventilation & Indoor Air Quality**<br><br>Renson | The Healthbox 3.0 monitors the air quality 24 hours a day for CO2 emissions or moisture and/or Volatile Organic Compounds (VOCs) (odour) per connected room. The ventilation level is hereby intelligently and fully automatically adjusted according to the measured air quality. This is done based on sensors in the control module. If the air quality in a room is optimal, the ventilation level remains limited, which provides savings in terms of heating and electricity consumption. The key features include:<br>• **SmartConnect function**: Healthbox 3.0 can be connected to the home network off and on Internet. When connected to the Internet, the app can be used to visualise data about the measured air quality from the device and, if necessary, to adjust the ventilation level temporarily and manually when necessary. Healthbox 3.0 can communicate with other smart |

[5] https://www.nrf.gov.sg/programmes/virtual-singapore
[6] https://new.siemens.com/global/en/company/about/businesses/real-estate/bim-pilot-project.html

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| | devices when incorporated into a smart home that is plugged into a home management system.<br>• **Data collection**: Healthbox 3.0 allows for collection and access of detailed information for occupants and summarised information for owners. To ensure that the privacy of the occupant is protected, the owner must indicate via the web portal that the Healthbox 3.0 is in a rental property.<br>• **User & installer apps**: the user app can be set in automatic and manual modes. It provides occupants with an overview per room/zone of the air quality and the corresponding ventilation level thanks to a colour code (blue: good, orange: moderate, red: substandard). In manual mode, the occupant can adjust the ventilation level for a certain duration for the entire home or per room/zone. Several Healthbox 3.0 can be controlled via a single app, whether in the same country or not. The installer app enables calibration and provides some benefits, such as guidance through the installation process, adjustment of the desired nominal air flow and configuration. |

## RECOMMENDATIONS

We have to put people in the centre of all our efforts in the design, construction, and use of our buildings, and reconsider what we can do to improve their lives and capacities. We are all conscious that we are still living through a period of great uncertainty, and we need political and corporate leaders to work together to deliver the vision for a greener, more digital and more resilient Europe. In doing so, we will need to continue driving strong partnerships at European and national level, with governments across industries and civil society.

As champions of a dynamic European IoT ecosystem, AIOTI Buildings Group is eager to create a positive impact by scaling digital building solutions that can benefit occupants, businesses, governments and societies, helping them decarbonise the EU building stock. To deliver against the transition in the built environment, it is vitally important to ensure that a clear people, green, digital focus, prioritisation and monitoring are applied when it comes to the distribution of these funds. As EU Member States develop their National Plans, we recommend investment for digital buildings be prioritised in the following areas:

1. **Infrastructure** - digital infrastructures are key to the development of the smart buildings of the future. 5G will improve connection speed and allow the development of applications that require low latency, high reliability or the connection of millions of low-energy sensors. Fibre networks must be extended as quickly as possible in all areas currently served by mixed copper infrastructure. Part of the resources of the Recovery Fund should be invested in research and development of future-proof networks and infrastructures in the context of smart buildings.
2. **Digitally-enabled solutions** - in the context of the Renovation Wave, funding conditionality for financing should not neglect improving a building's smartness from both an energy efficiency and indoor environmental quality perspective. Technologies including IoT, smart connectivity, AI, edge computing can be enablers to achieve the objectives of the Renovation Wave. The potential of connectivity and digital tools to enable energy savings will prevent long-term lock-in-effects and prepare for flexible use scenarios of buildings in the future. Investment into collaboration hubs around buildings will enable technology providers, manufacturers and service providers to develop joint solutions and platforms that all ecosystem stakeholders will be able to benefit from associated data generation.
3. **Building Information Modelling (BIM) -** promote BIM in public tenders by basing public procurement on the MEAT[7] principle. Digital solutions based on ecosystems of Digital Twins will prove key to reaching the green goals efficiently. Public sector should lead by example. All public EU tenders (e.g., from cities), for both new buildings and renovations, should be made digital and have BIM included with a coordinated overall design.
4. **Digital know-how and skills** - in parallel with the construction of the networks and services implementation, there is a need to train building professionals (such as designers and installers) for the secure digital environment in order for it to be an engine of inclusive growth. Digital skills development needs investment to retrain building professionals for the design, deployment and maintenance of the technologies needed to achieve more energy efficient and smart buildings.
5. **Human-centric** – all renovations should be targeted to support health and wellbeing for the occupants. Indoor environmental quality if mandatory to provide people a decent place to work and stay.

[7] Most Economically Advantageous Tender

In addition to Investment, enablers must be put in place in legislation through policy reforms, primarily:

1. The scope of Article 39, Investment aid for energy efficiency projects in buildings, in the **revision of the General Block Exemption Regulation (GBER),** should be expanded to include projects targeted at improving digitalisation in buildings and indoor environmental quality.
2. The scope, in the revision of the **Environmental and Energy State Aid Guidelines**, should be widened to include measures aimed at fostering digitalisation and at improving energy efficiency and indoor environmental quality in the built environment.
3. The implementation of the **Sustainable Finance Taxonomy Regulation Technical Screening Criteria for Climate Change Mitigation and Adaptation** should consider digitalisation and indoor environmental quality conditionality to better harness private finance to promote energy efficient, smart and healthy buildings.
4. Under the upcoming review of the **Public Procurement Directive,** the thresholds under Article 4 should be lowered to ensure more public procurement is covered by and therefore can be made subject to Green Public Procurement criteria. The loophole in the Public Procurement Directive that excludes public service contracts for the acquisition or rental of existing buildings, including public housing stock, should be closed. Purchase of existing buildings by governments should be conditional on the EPC/IEQ class of the building. Renewal of rental contracts of existing buildings should be conditional on renovations being undertaken if the building falls in lower EPC classes.
5. The **EU Green Public Procurement Criteria** should be expanded to cover all public buildings, not just offices, i.e. to public housing, hospitals, schools and libraries, whilst ensuring that digital conditionality is fully integrated.

**We share President von der Leyen's vision to "build back better by design" and deliver Europe's digital decade. To make our buildings and communities' climate neutral and smart, there is an absolute need for achieving human-centric, green and digital transformation to deliver sustainable, long-lasting, and impactful change.**