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THE SUSTAINABLE BUILDINGS E-LEARNING PROGRAM

Module 10

THE EUROPEAN GREEN DEAL AND THE BUILDING SECTOR

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TÜRKİYE SUSTAINABLE BUILDINGS NETWORK

The Türkiye Sustainable Buildings Network was established as part of the “Türkiye Sustainable Buildings Network Project,” which is co-funded by the European Union under the Civil Society Action towards European Green Deal Grant Scheme. The project is coordinated by WRI Türkiye, in partnership with the Zero Energy and Passive House Association (SEPEV) and with the support of the Danish Green Growth Network (DGGN).

The network operates with the aim of supporting climate action in the building and construction sector, promoting green transformation, enhancing the technical knowledge and skills of sector stakeholders, and mainstreaming the concept of sustainable buildings.



As part of this effort, the Sustainable Buildings E-Learning Program has been developed to serve as a comprehensive knowledge resource for all stakeholders in the building sector. The program consists of 10 training modules designed to contribute to the sector's sustainability, energy efficiency, and low-carbon transition goals.

Module 1: Overview of Sustainable Buildings

Module 2: Decarbonization in the Building Sector and the Whole Life-Cycle Approach

Module 3: Sustainable Building Materials

Module 4: Sustainable Construction and Demolition Practices

Module 5: District Heating and Cooling Systems

Module 6: Innovative Building Technologies

Module 7: Financing Instruments for Sustainable Buildings

Module 8: Emissions Trading Systems and the Building Sector

Module 9: Energy-Efficient and Passive Building Design

Module 10: The European Green Deal and the Building Sector

For more information about the Türkiye Sustainable Buildings Network and to access other modules, please visit [the link](#).



MODULE OBJECTIVES

The European Green Deal is a comprehensive policy framework based on the European Union's goal of achieving climate neutrality by 2050. The European Green Deal places climate action and the reduction of carbon emissions at its core while promoting sustainable growth.

In this transformation process, the building sector plays a critical role due to its significant share in the European Union's total energy consumption and carbon emissions. This module aims to explore the relationship between the European Green Deal and the building sector, addressing strategies, policies, and innovative solutions for reducing emissions in the sector.

Module objectives:

- To understand the core objectives of the European Green Deal and its connection to the building sector.
- To comprehend the strategic importance of the building sector in reducing carbon emissions.
- To explain key concepts such as Zero-Emission Buildings (ZEB), Nearly Zero-Energy Buildings (NZEB), and the circular economy.
- To examine the prominent policies and regulations under the European Green Deal —such as **the Energy Performance of Buildings Directive (EPBD), the Fit for 55 package, and the Renovation Wave**—and analyze their impact on the building sector.
- To explore financial instruments and incentives offered to the building sector within the scope of the European Green Deal.
- To gain practical insights by examining good practice examples from Türkiye and the European Union.
- To ensure stakeholders are equipped with the strategic tools required for a green transition.



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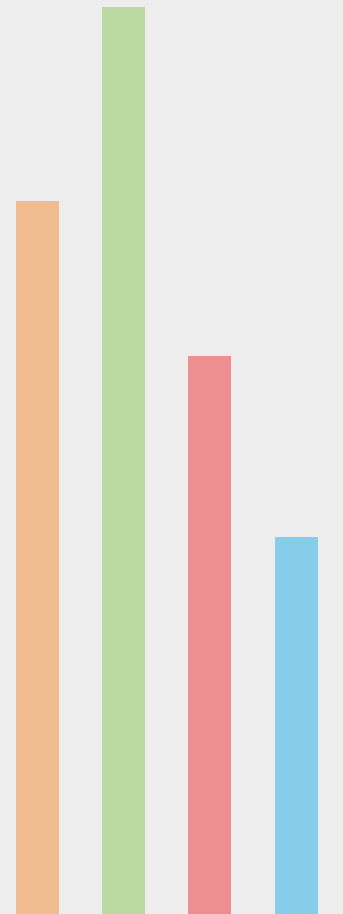
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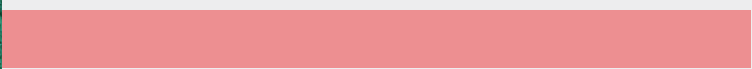
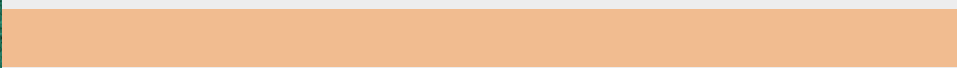
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Section 1

INTRODUCTION TO THE EUROPEAN GREEN DEAL



1.1. Overview of the European Green Deal

The European Green Deal is a strategy that holistically integrates economic and environmental considerations, grounded in the European Union's target of achieving climate neutrality by 2050. Announced by the European Commission in 2019, this plan aims to promote sustainable economic growth while reducing carbon emissions and ensuring the more efficient use of natural resources.

The European Green Deal serves as the cornerstone of the European Union's green economic transformation and also holds significant influence on a global scale. It seeks to reduce Europe's dependence on fossil fuels, promote renewable energy sources, enhance environmental sustainability, and support green employment.



1.2. Key Pillars of the European Green Deal

The European Green Deal is a comprehensive policy framework implemented by the European Union to achieve its climate neutrality goal. While promoting sustainable development, the Deal encompasses a set of core pillars designed to support economic and social transformation. These components form the backbone of the green transition and are designed to work in synergy to reduce carbon emissions [1], [2].

The key pillars of the European Green Deal are as follows::



Climate Action and Carbon Neutrality

- Europe aims to become carbon neutral by 2050.
- A minimum 55% reduction in greenhouse gas emissions is targeted by 2030.
- The Emissions Trading System (ETS) is being strengthened to encourage sectoral contributions to emission reductions.



Clean, Affordable, and Secure Energy

- The aim is to increase the use of renewable energy sources and improve energy efficiency.
- The transition away from fossil fuels is being accelerated, while ensuring energy supply security.



Sustainable Industry and Circular Economy

- The shift to low-carbon industrial production is being supported.
- Waste management and recycling are promoted in line with circular economy principles.



Energy and Resource-Efficient Buildings

- Enhancing the energy performance of buildings is a key goal.
- The Renovation Wave strategy envisions transforming existing buildings to make them more sustainable.



Sustainable and Smart Mobility

- The transition to carbon-free transportation systems is being encouraged.
- Plans include expanding infrastructure for electric vehicles and promoting rail and maritime transport.



Farm to Fork Strategy

- The goal is to make food systems more sustainable.
- Targets include reducing the use of chemical fertilizers and pesticides.



Biodiversity and Ecosystem Protection

- The EU aims to protect 30% of its land and sea areas by 2030.
- Objectives include restoring natural habitats and enhancing ecosystem services.



Zero Pollution and a Toxic-Free Environment

- Targets include reducing air, water, and soil pollution.
- Stricter regulations are being introduced on the use of chemicals.



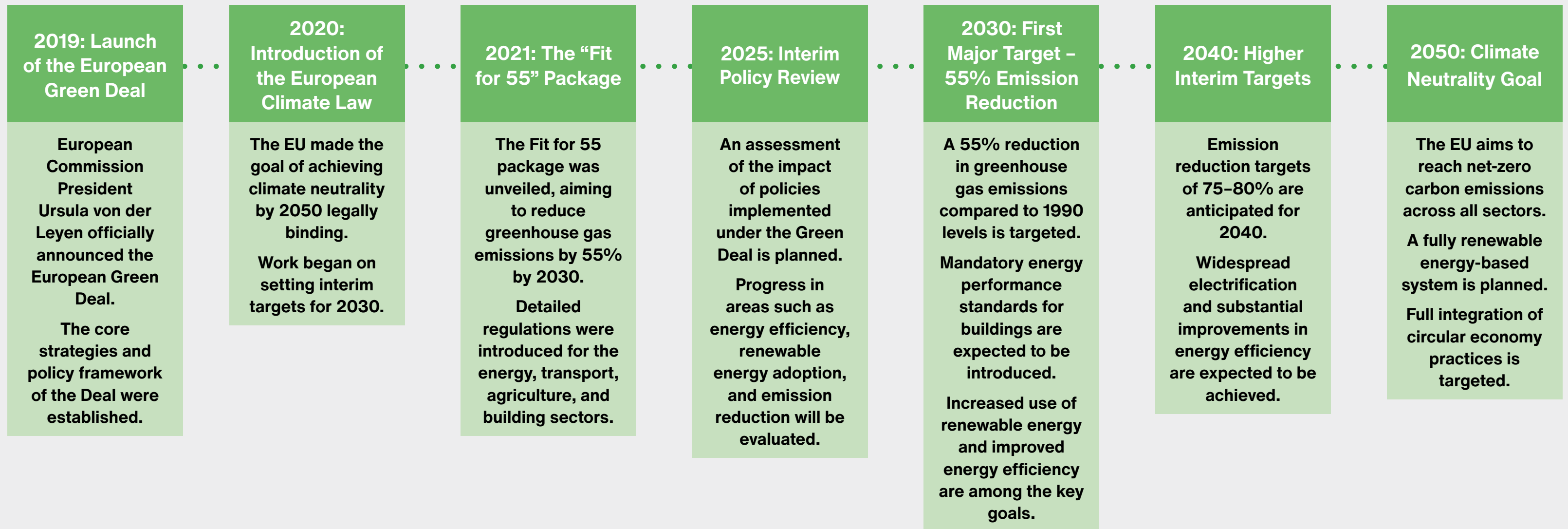
Just Transition Mechanism and Financing

- DSupport mechanisms have been developed to ensure that the shift to a low-carbon economy is socially just.
- EU funds and green financing strategies are being implemented to support investments under the European Green Deal.

1.3. Timeline of the European Green Deal

The European Green Deal outlines a phased roadmap aimed at making the European Union a climate-neutral continent by 2050. Key milestones identified along this path guide Europe’s progress toward achieving its emission reduction targets [3],[4].

Key Milestones



1.3. Timeline of the European Green Deal

The year 2030 is a critical milestone in the implementation of the European Green Deal. These interim targets form a solid and determined foundation on the path to 2050:

- **Greenhouse Gas Emissions:** A reduction of at least 55% compared to 1990 levels is targeted.
- **Renewable Energy:** It is aimed to significantly increase the share of renewable sources in energy supply.
- **Energy Efficiency:** The goal is to make energy use more efficient and sustainable across all sectors.
- **Building Sector:** Under the Renovation Wave strategy, the building renovation rate is planned to be at least doubled.



1.4. Legislation and Policies

Under the European Green Deal, a range of policies and regulations have been developed to combat climate change and achieve sustainable development goals. Existing legislation has also been updated to align with the new targets. These regulations are designed to support the European Union's goal of climate neutrality by 2050 and include various measures to ensure sectoral alignment.

Policy/Legislation	Objective	Target	Highlights
Fit for 55	Reducing greenhouse gas emissions by 55% by 2030.	Comprehensive emission reductions across the energy, transport, industry, and building sectors.	Emissions Trading System (ETS) and Carbon Border Adjustment Mechanism (CBAM).
Renovation Wave	Renovating energy-inefficient buildings across Europe to reduce energy consumption and emissions.	To double the building renovation rate by 2030.	Nearly Zero-Energy Buildings (NZEB) and reduction of energy poverty..
RePowerEU	Increasing Europe's energy independence and rapidly boosting the share of renewable energy sources.	To establish an energy system independent of fossil fuels.	Green hydrogen projects and energy storage solutions.
European Climate Law	Making the goal of climate neutrality by 2050 legally binding.	To align national energy and climate plans of Member States.	Legal framework binding 2030 and 2050 targets..
Energy Efficiency Directive	Improving energy efficiency by reducing energy consumption across the EU.	To make energy efficiency measures mandatory in building renovations.	"Energy Efficiency First" principle and absolute energy reduction targets..
Renewable Energy Directive	Increasing the use of renewable energy and reducing carbon emissions.	To raise the share of renewables in the EU energy mix to 40% by 2030.	Support for local energy communities in renewable energy projects..
Energy Performance of Buildings Directive (EPBD)	Improving the energy performance of buildings and reducing carbon emissions.	All new buildings to be zero-emission by 2030; gradual performance improvement for existing buildings.	Energy performance certificates, digital building passports, national building renovation plans.

1.5. The Importance of Buildings in the European Green Deal

Under the European Green Deal, the building sector plays a critical role in terms of energy consumption and carbon emissions.

Energy Consumption and Contribution to Emissions of Buildings

- **High Energy Consumption:** Buildings are an energy-intensive sector, consuming large amounts of energy for electricity, heating, and cooling. As this energy is often supplied from carbon-intensive sources such as fossil fuels, it leads to increased emissions.
- **Significant Contribution to Emissions:** More than one-third of carbon emissions in Europe originate from buildings. These emissions are largely due to the low energy efficiency of buildings and the insufficient use of renewable energy sources.



1.5. The Importance of Buildings in the European Green Deal



BUILDING-FOCUSED STRATEGIC APPROACH FOR EFFECTIVE DECARBONIZATION

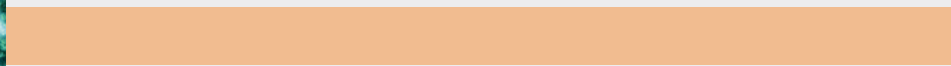
The following strategic approaches have been defined under the European Green Deal to enhance energy efficiency and reduce carbon emissions in the building sector:

- **Renovation Wave:**
 - One of the main objectives of the European Green Deal, the Renovation Wave, targets the renovation of buildings with low energy efficiency.
 - Improving the energy performance of buildings is one of the most effective ways to reduce carbon emissions.
- **Nearly-Zero Energy Buildings (NZEB) and Zero-Emission Buildings (ZEB):**
 - The implementation of NZEB and ZEB standards in new constructions and renovations aims to minimize energy consumption and eliminate carbon emissions from buildings.
- **Use of Renewable Energy:**
 - The integration of renewable energy systems (e.g. solar panels, heat pumps) in buildings is being encouraged.
 - This reduces fossil fuel consumption and lowers the environmental impact of buildings.
- **Implementation of Circular Economy Principles:**
 - The reuse of construction materials and waste management are promoted through the adoption of circular economy principles in the building sector.
 - This approach significantly reduces the environmental impact of construction processes.
- **Decarbonization of Heating and Cooling Systems:**
 - The transition to clean energy solutions in heating and cooling systems—which account for a large share of buildings’ energy consumption—is a key goal.



Section 2

THE ROLE OF THE BUILDING SECTOR IN ACHIEVING THE EUROPEAN GREEN DEAL GOALS





2.1. Overview of Emissions from the Building Sector

The building sector accounts for a significant share of total greenhouse gas emissions in the European Union. As a sector that is critical in terms of both energy consumption and carbon emissions, buildings are undergoing a strategic transformation in the fight against climate change. Emissions from the sector are classified as direct and indirect. The challenges in reducing emissions from buildings stem from the structural, economic, and technical dynamics of the sector.

Direct Emissions:

Direct emissions refer to greenhouse gas emissions resulting from the use of fossil fuels in buildings. These typically originate from the following sources:

- **Heating and Cooling Systems:** Boilers, furnaces, and central heating systems that operate on fossil fuels are major contributors to carbon emissions.
- **Water Heating Systems:** Natural gas water heaters used in residential and commercial buildings contribute to direct CO₂ emissions.
- **Dining Hall and Kitchen Use:** Gas-powered stoves and ovens in commercial and residential buildings generate emissions.

Indirect Emissions:

Indirect emissions arise from the production of energy and building materials used in buildings. These emissions contribute to the building's overall carbon footprint throughout its entire life-cycle.

- **Electricity Use:** A significant share of the electricity consumed in buildings is still generated from fossil fuels. Lighting, appliance use, and HVAC (heating, ventilation, and air conditioning) systems increase indirect emissions.
- **Construction and Material Production:** The manufacturing of materials such as cement, steel, glass, and aluminum generates high levels of carbon emissions.
- **Demolition and Waste Management:** The demolition of buildings at the end of their life-cycle and the disposal of resulting waste contribute to indirect emissions.

2.1. Overview of Emissions from the Building Sector

Although comprehensive policies have been developed in the European Union to reduce carbon emissions from the building sector, various structural and economic barriers continue to hinder progress:

- **Large Number of Old and Energy-Inefficient Buildings:**
 - A vast majority of buildings in Europe were constructed before 1980 and perform poorly in terms of energy efficiency.
 - Undertaking deep renovation of these buildings is both costly and time-consuming.
- **High Renovation Costs:**
 - Transitioning to energy-efficient technologies (e.g., heat pumps, solar panels) requires high upfront investments.
 - For low-income homeowners in particular, these costs pose a significant financial burden.
- **Challenges in Integrating Renewable Energy:**
 - Implementing solar, geothermal, and other renewable energy systems at the building scale requires substantial infrastructure and investment.
 - Existing grid systems are often not equipped to accommodate decentralized renewable energy production.
- **Decarbonizing the Construction Sector:**
 - The production of construction materials is highly carbon-intensive, and low-carbon alternatives have not yet been widely adopted.
 - There is a lack of legal and technical infrastructure to fully implement circular economy principles.



- **Policy and Financing Barriers:**
 - The tightening of building codes and energy standards is progressing slowly.
 - Green transition financing is not distributed equally across countries, and in some cases, government incentives remain insufficient.

2.2. Renovation Wave Strategy



The Renovation Wave, introduced under the European Green Deal, is one of the most critical strategies for reducing carbon emissions in the building sector. A large share of the existing building stock in the European Union has low energy performance, and to meet climate neutrality targets by 2050, these buildings need to be renovated. The strategy aims to at least double the annual renovation rate across the EU by 2030 and to promote the widespread adoption of energy-efficient, low-carbon buildings [3].

Given that 85% of today's buildings in Europe will still be in use by 2050, improving the energy efficiency of the current stock is crucial. However, the current average renovation rate in the EU is around 1%, which is insufficient to reach the 2050 targets. The Renovation Wave Strategy therefore aims to double this rate by 2030, raising the annual renovation rate to 2% [4], [5].

Within this framework:

- Large-scale renovations to improve energy efficiency are being promoted, especially for public buildings.
- Buildings with poor energy performance will be prioritized and the renovation process will be accelerated.
- The plan is to renovate 35 million buildings by 2030 across Europe.

2.2. Renovation Wave Strategy

Priorities of the Renovation Wave:

1. Improving Energy Efficiency

- Renovated buildings will consume less energy and produce lower carbon emissions.
- Insulation, window systems, smart building technologies, and high-efficiency heating and cooling systems will be promoted.
- Energy performance certificates will be made mandatory for buildings, and incentive mechanisms will be developed for building owners.

2. Promoting Deep Renovations

- Deep renovations refer to comprehensive improvements that aim to reduce a building's energy consumption by at least 60%.
- Instead of partial upgrades, a holistic renovation approach will be adopted to improve both the energy and carbon performance of buildings.
- The use of climate-resilient designs and durable building materials will be encouraged.

3. Addressing Energy Poverty

- By improving inefficient buildings inhabited by low-income households, the strategy aims to eliminate energy poverty.
- Around 34 million people in the EU struggle to pay their energy bills, and this strategy will introduce specific financial support and incentives targeting this group.
- Improvements to social housing, increased subsidies, and rent support for low-income families will be implemented.



2.3. Zero-Emission Buildings (ZEB)

Zero Emission Buildings (ZEB) are highly energy-efficient structures that generate no net greenhouse gas emissions during their operation and integrate renewable energy sources. The ZEB concept is recognized as a key tool for decarbonizing the building sector under the European Green Deal and the Energy Performance of Buildings Directive (EPBD).

Buildings that meet ZEB standards:

- Minimize energy consumption,
- Maximize the use of renewable energy sources,
- Eliminate or significantly reduce fossil fuel use,
- Are equipped with energy-efficient systems and smart building technologies.



2.4. Energy Efficiency First Principle

The “Energy Efficiency First” (EEF) principle is a core tenet established under the European Green Deal and the Energy Efficiency Directive. This principle emphasizes that energy resources should be used in the most efficient way possible and that energy savings should always be considered a priority option.

According to this principle:

- Reducing energy demand is a more cost-effective and sustainable approach than developing new energy generation capacity.
- Energy efficiency should be prioritized as a key investment area and implemented across all sectors.
- In the building, industrial, and transport sectors, solutions that improve energy efficiency should be prioritized first; renewable energy sources should only be pursued if these solutions prove insufficient.
- This approach contributes to reducing carbon emissions, enhancing energy independence, and lowering energy bills.

APPLICATION EXAMPLES IN BUILDING DESIGN AND RENOVATIONS

The implementation of the Energy Efficiency First principle in the building sector is achievable through the improvement of existing structures and the design of newly constructed buildings according to energy-efficient standards.

1. Energy Efficiency First in Building Design: Minimizing energy consumption through passive design strategies

- Maximizing the use of natural daylight and integrating smart lighting systems
- Using high-performance insulation materials to reduce heat loss
- Smart energy management in heating, ventilation, and air conditioning (HVAC) systems

2. Energy-Efficient Retrofitting of Existing Buildings (Renovation Applications):

Renovation works aimed at improving the energy efficiency of existing buildings are encouraged under the Renovation Wave strategy.

- Preventing heat loss by improving insulation in buildings
- Replacing old and inefficient boilers with high-efficiency heat pumps
- Optimizing energy use with smart building automation system
- Integrating solar panels and other renewable energy sources

3. Energy Efficiency Applications at the Urban Scale:

The principle of energy efficiency should be applied not only to individual buildings but also at the city scale.

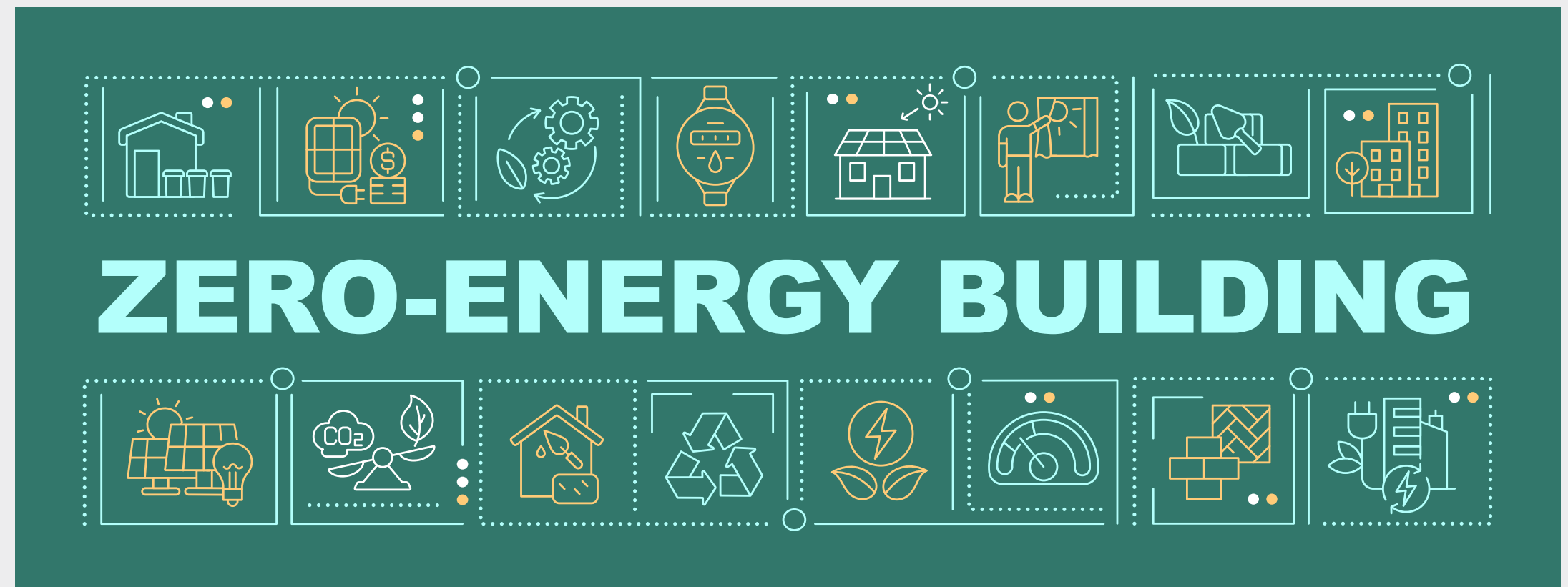
- Optimizing energy consumption through smart city applications
- Use of district heating and cooling systems
- Green infrastructure solutions (green roofs, energy-efficient street lighting, etc.)

2.5. Nearly Zero-Energy Buildings (NZEB)

Nearly Zero-Energy Buildings (NZEB) are defined as buildings with very low energy demand, where a significant portion of this demand is met through renewable energy sources. Under the European Green Deal and the Energy Performance of Buildings Directive (EPBD), it is mandated that all new buildings comply with NZEB standards by 2030 [6].

NZEBs:

- Minimize energy consumption to the lowest possible level,
- Are equipped with high-efficiency heating, cooling, and ventilation systems,
- Operate in integration with renewable energy systems (e.g., solar panels, geothermal heating),
- Support sustainable urban transformation by minimizing carbon emissions.



2.5. Nearly Zero-Energy Buildings (NZEB)

THE ROLE OF REGULATORY FRAMEWORKS AND THE EUROPEAN GREEN DEAL IN ACHIEVING NZEB TARGETS BY 2030

The European Green Deal and the Energy Performance of Buildings Directive (EPBD) introduce stringent building regulations aimed at improving the energy performance of the building sector. Within this framework, the following strategies have been identified to achieve NZEB standards:

1. New Building Regulations and Directives

- Since 2021, all newly constructed public buildings are required to comply with NZEB standards.
- Starting from 2030, all new buildings are expected to be constructed in line with NZEB requirements.
- The upgrading of existing buildings to NZEB standards during renovation processes is actively encouraged.
- Energy performance certificates have been revised to tighten energy consumption classifications in line with NZEB requirements.

2. Strengthening Energy Efficiency Standards

- Isı yalıtımı ve bina kabuğunun enerji kaybını en aza indirecek şekilde tasarlanması zorunlu hale getirilmektedir.
- Pencere ve cephe sistemlerinde yüksek yalıtımlı malzemeler kullanımı teşvik edilmektedir.
- Isıtma ve soğutma sistemlerinin akıllı otomasyon teknolojileri ile enerji verimli hale getirilmesi gerekmektedir.

3. Promoting the Use of Renewable Energy

- Making the installation of solar panels on the roofs and façades of new buildings mandatory is currently under consideration.
- The connection of buildings to centralized heating and cooling systems is being encouraged.
- With the implementation of energy storage solutions (battery systems), buildings are enabled to maximize the use of self-generated energy.

4. Retrofitting and Upgrading Existing Buildings to NZEB Standards

- The Renovation Wave strategy is being implemented to upgrade the energy efficiency of existing buildings to NZEB levels.
- Financial incentives and green loans are being provided to building owners.
- Improving the energy performance of existing buildings will contribute to making the entire building stock zero-emission by 2050.

2.6. Circular Economy in the Building Sector



The European Green Deal aims to reduce waste generation, enhance material reuse, and improve resource efficiency by promoting circular economy principles in the building and construction sector. Unlike the traditional linear economy model (produce, use, dispose), the circular economy adopts a (reuse, recycle, extend material lifespan) approach, playing a crucial role in the sustainable transformation of the built environment.

Key policies supporting the circular economy under the European Green Deal include:

- **Designing New Buildings According to Circular Economy Principles:** Modular design, low-carbon materials, and recyclable building components are encouraged during the construction process.
- **Enhancing Resource Efficiency Throughout a Building's Life-Cycle:** The use of energy-efficient materials, renewable raw materials, and waste-reducing construction techniques is promoted.
- **Promoting Material Recycling During Renovation and Demolition Processes:** The recovery of construction and demolition waste can significantly reduce the sector's carbon footprint.
- **Implementation of the Circular Economy Action Plan (CEAP):** Published in 2020, the CEAP introduces specific regulations to prevent material waste and promote sustainable resource use in the construction sector.

2.6. Circular Economy in the Building Sector

THE IMPORTANCE OF MATERIAL REUSE AND WASTE REDUCTION

The building sector accounts for approximately 35% of total waste in Europe, and a significant portion of this waste is disposed of without being recycled. By applying circular economy principles, material reuse and waste reduction efforts not only minimize environmental impacts but also offer economic benefits.

1. Material Reuse

The reuse of construction materials such as concrete, steel, glass, wood, and plastic is gaining increasing importance in the building and construction industry. Modular building components designed for disassembly and reuse are becoming more common.

The use of reclaimed bricks and building materials made from recycled concrete is encouraged.

Circular design practices ensure that buildings can be easily dismantled at the end of their life cycle, making materials available for reuse.

2. Waste Reduction Strategies

To reduce waste generated throughout the building life-cycle, the following measures are being implemented under the European Green Deal:

Increasing recycling rates during construction and demolition processes (EU Member States aim to recycle 70% of construction and demolition waste by 2025).

Material Passports: Digital systems are being developed to record the type, recyclability, and reuse potential of materials used in buildings.

Building Renovation Passports: Strategies are being developed to guide material selection in line with circular economy principles while improving the energy efficiency of buildings.



2.7. Decarbonization of Heating and Cooling Systems

The European Green Deal aims to accelerate decarbonization in the building sector by phasing out fossil fuels in heating and cooling systems. Approximately 75% of buildings in Europe are energy-inefficient, and most are still heated using fossil fuels (7). Therefore, transitioning to heat pumps, district energy systems, and renewable energy solutions is critical for both emission reductions and energy efficiency.

TRANSITION TO CLEAN TECHNOLOGIES

Under the European Green Deal, the decarbonization of heating and cooling systems in the building sector and the widespread adoption of low-carbon solutions are being promoted. Key clean heating and cooling technologies include:

1. Heat Pumps

- Utilize heat from the air, water, or ground to provide heating and cooling for buildings.
- As they do not rely on direct fossil fuel combustion, they reduce emissions to nearly zero.
- Offer high energy efficiency and integrate seamlessly with the power grid through renewable energy sources.



2. District Heating and Cooling Systems

- Supply heating or cooling from a centralized energy source to multiple buildings in urban areas.
- When decoupled from fossil fuels, they enable large-scale carbon reductions.
- Eliminate the need for individual boiler systems, thereby enhancing local energy efficiency.

3. Heating and Cooling with Renewable Energy

- Low-carbon solutions such as geothermal energy, solar thermal collectors, and biomass boilers are encouraged.
- Solar-assisted water heating systems are increasingly used, especially in residential buildings.
- Electrification enables heating and cooling systems to rely entirely on renewable energy sources.

2.7. Decarbonization of Heating and Cooling Systems



IMPACT OF HEATING AND COOLING DECARBONIZATION ON RENOVATION AND NEW CONSTRUCTION

Under the European Green Deal and the Energy Performance of Buildings Directive (EPBD), fossil-free heating and cooling solutions are becoming mandatory in both renovation projects and new building construction.

1. Impact on New Construction

- As of 2025, the installation of fossil fuel-based boilers in new buildings is planned to be banned.
- New buildings must be designed with direct integration of heat pumps or district heating systems.
- Passive cooling strategies and solar-integrated heating solutions are encouraged in architectural designs.

2. Impact on Renovation Projects

- During the modernization of energy-inefficient older buildings, heat pumps and renewable energy systems must be implemented.
- Local authorities are being encouraged to expand district heating infrastructure.
- Energy efficiency improvements help reduce buildings' heating and cooling needs, thereby lowering overall energy demand.

2.8. The Role of Renewable Energy in the Building Sector

Under the European Green Deal, the integration of renewable energy sources into the building sector has become a top priority for decarbonization. As a significant portion of building energy consumption still relies on fossil fuels, the widespread adoption of renewable systems is a critical step for both emissions reduction and energy security.

INTEGRATION OF RENEWABLE TECHNOLOGIES IN BUILDINGS

Renewable energy integration in the building sector applies to both new constructions and the renovation of existing buildings. The ability of buildings to generate their own energy and integrate it into the grid enhances the sustainability of energy use.

1. Photovoltaic (PV) Solar Panels

- The installation of solar panels on rooftops and façades is being actively promoted.
- PV systems are considered the primary energy source for net-zero energy buildings.
- When combined with energy storage technologies, they enable more efficient use of surplus energy.

2. Solar Thermal Collectors

- Solar-powered water heating systems are becoming more common in residential and commercial buildings.
- They consume less energy compared to electric heating systems.
- These systems are included in the sustainable building standards that are expected to become mandatory across EU member states.

3. Wind Energy

- Renewable energy can be generated through building-integrated micro wind turbines.
- In larger-scale projects, wind farms are used to meet the energy needs of buildings.

4. Heat Pumps and Geothermal Energy

- Heat pumps are among the most efficient solutions for meeting heating and cooling needs while reducing fossil fuel use.
- The integration of geothermal energy into district heating systems contributes to lower carbon emissions from buildings.

5. Building-Integrated Energy Storage Systems

- These systems store energy generated by solar panels and wind turbines to enhance overall efficiency.
- Stored energy can be used during periods of low renewable generation, optimizing energy consumption patterns.

2.8. The Role of Renewable Energy in the Building Sector

SPECIFIC TARGETS FOR THE USE OF RENEWABLE ENERGY IN THE SECTOR

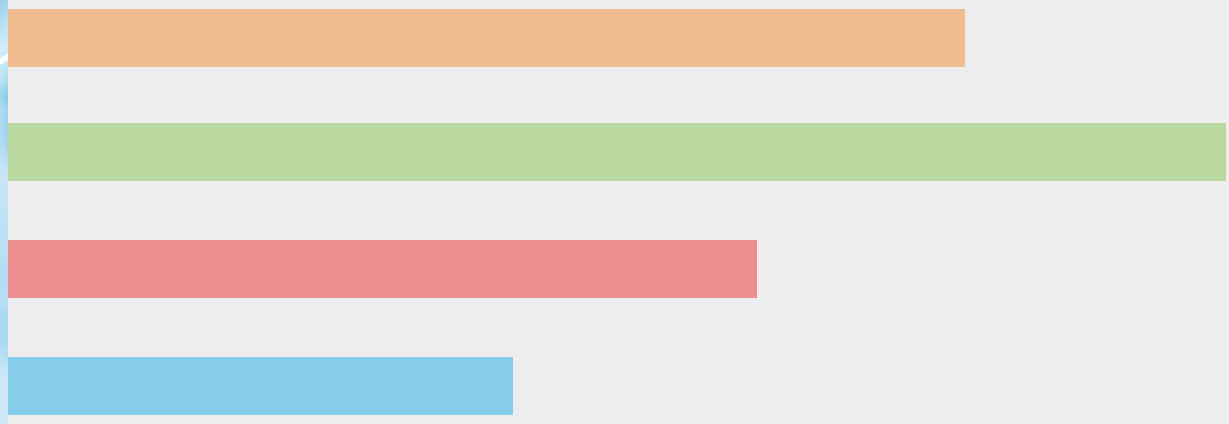
- By 2025, it is targeted that at least 50% of new public buildings will be powered by renewable energy.
- By 2030, all new buildings are planned to be net-zero emissions and to use 100% renewable energy.
- Through the renovation of existing buildings, the use of renewable energy across the EU is expected to increase by 40% by 2030.
- By 2050, the building sector is expected to be fully decarbonized, with all buildings transitioning to renewable energy.





Section 3

POLICIES AND REGULATIONS FOR THE BUILDING SECTOR



3.1. Energy Performance of Buildings Directive

OVERVIEW OF THE EPBD'S ROLE IN DECARBONIZATION

The Energy Performance of Buildings Directive (EPBD) is the European Union's core legislation aimed at improving energy efficiency in the building sector. Originally adopted in 2002, the directive underwent significant revisions in 2010 and 2018.

The most recent update was adopted on April 12, 2024, and entered into force on May 28, 2024. With the 2024 revision, the EPBD provides a framework that supports the EU's goal of achieving a fully decarbonized building stock by 2050. Under this framework, Member States are expected to develop policies aimed at reducing the energy consumption of buildings, taking into account their national circumstances.



NEW PROVISIONS OF THE EPBD UNDER THE EUROPEAN GREEN DEAL

In line with the European Green Deal, the recent amendments to the Energy Performance of Buildings Directive (EPBD) introduce mandatory renovation requirements and zero-emission building targets [1].

1. Mandatory Renovation Requirements

- By 2030, the renovation of all buildings with poor energy performance—especially public buildings—will be mandatory.
- Buildings with the lowest energy efficiency ratings, based on energy performance certificates, will be prioritized for improvement.
- The lowest-performing 15% of non-residential buildings must be renovated by 2027, and the same requirement will apply to residential buildings by 2030.

2. Zero-Emission Building (ZEB) Requirement

- From 2030 onward, all new buildings must be zero-emission.
- New buildings will operate entirely on renewable energy sources, phasing out the use of fossil fuels.
- By 2050, the entire building stock in Europe is targeted to become zero-emission.

3. Minimum Energy Performance Standards (MEPS)

- Compliance with minimum energy efficiency standards has been made mandatory.
- Energy-inefficient buildings must undergo performance improvements before they can be sold or rented.
- Public and commercial buildings that fail to meet the required energy performance levels will be subject to renovation.

4. Smart Building Technologies and Digitalization

- The integration of smart building systems and energy management technologies is being promoted.
- With digital building passports, each building's energy performance, consumption data, and renovation history will be recorded and monitored.

3.2. Fit for 55 Package and Buildings

The Fit for 55 package is a comprehensive set of policies and regulations developed by the European Union to achieve its goal of reducing greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels.

It forms a cornerstone of the European Green Deal and aims to drive transformation across the energy, transport, industry, and building sectors.

Key Regulations under the Fit for 55 Package

- **Strengthening of the EU Emissions Trading System (EU ETS):**
 - Emission reduction targets have been tightened for sectors under the EU ETS (energy, industry, aviation).
 - A new ETS 2 system has been introduced for buildings and transport.
- **Carbon Border Adjustment Mechanism (CBAM):**
 - A carbon pricing mechanism will be applied to imported products such as cement, steel, aluminum, fertilizers, and hydrogen entering the EU.
- **Renewable Energy Directive III:**
 - By 2030, 42.5% of the EU's energy must come from renewable sources.
 - Member states are required to accelerate renewable energy projects.
- **Energy Efficiency Directive:**
 - Total energy consumption is to be reduced by 11.7% by 2030.
 - Efficiency targets for public buildings are mandatory.
- **Building Emissions and Standards:**
 - From 2027, buildings will be subject to carbon pricing under the new ETS 2.
 - All new buildings must be zero-emission starting in 2030.



- **Carbon Sinks:**
 - Carbon sink capacity will be increased through improvements in agricultural and forest areas.
- **Vehicle Emissions and Engine Ban:**
 - Sales of new petrol and diesel vehicles will be banned as of 2035.
 - Electric vehicles and infrastructure will be promoted.
- **Social Climate Fund:**
 - Support will be provided to low-income groups for building renovations and access to clean transportation.



3.2. Fit for 55 Package and Buildings

As part of the package, various regulations and financial mechanisms have been introduced to improve energy efficiency in buildings, reduce fossil fuel use, and cut emissions.

KEY REGULATIONS AND SANCTIONS FOR THE BUILDING SECTOR

Core Regulations

1. New European Union Emissions Trading System (EU ETS 2)

- From 2027 onward, emissions from buildings will be subject to carbon pricing.
- The cost burden will increase for buildings that rely on fossil fuels.
- Solutions such as heat pumps, solar energy, and insulation will be promoted.

Impact: Building owners and construction companies will be required to adopt renewable energy and implement energy efficiency measures.

2. EPBD Revision

- From 2030, all new buildings must be zero-emission.
- Existing poorly performing buildings will be renovated.
- Energy efficiency will become mandatory in public buildings.

Impact: Building owners and the construction sector are now obligated to increase investments in energy efficiency.

3. Revision of the Renewable Energy Directive (RED)

- The use of renewable energy in buildings will be increased.
- The share of renewable energy in both new and renovated buildings will be raised.
- The directive aims to promote the integration of renewable energy sources in district heating and cooling systems.
- A shift away from fossil fuels will be encouraged through the wider adoption of heat pumps, solar panels, and biomass technologies.

Impact: The deployment of solar panels, heat pumps, and other renewable energy technologies will be promoted. Fossil fuel-based systems in the building sector will be replaced with low-carbon alternatives.

4. Revision of the Energy Efficiency Directive (EED)

- Energy efficiency requirements for buildings have been strengthened.
- The European Union aims to reduce total energy consumption by 11.7% across all member states.
- Improving energy efficiency in public buildings has been made mandatory.
- Financial incentives for building renovations will be expanded.

Impact: Although renovation costs for building owners may increase in the short term, energy bills are expected to decrease in the long term. Stricter energy efficiency standards will apply to newly constructed buildings.

3.2. Fit for 55 Package and Buildings



SUPPORT AND FINANCIAL MECHANISMS FOR THE BUILDING SECTOR

Social Climate Fund

- Financial support mechanisms will be provided for low-income building owners.
- Incentives for energy efficiency projects in buildings will be increased to prevent energy poverty.

EU Green Financing and Grant Programs

- Building renovation projects will be supported through various funds such as Horizon Europe, InvestEU, and the LIFE Programme.
- Access to loans will be expanded for green transformation projects in the housing sector.

3.3. Building Renovation Passports

Building Renovation Passports (BRPs) are digital and structured roadmaps developed to ensure the modernization of buildings by improving their energy efficiency. They have been designed to accelerate the process of transforming existing buildings into zero-emission buildings under the European Green Deal and the Energy Performance of Buildings Directive (EPBD) [7].

- BRPs serve as customized guides that outline the necessary steps to improve the energy performance of a building.
- They provide a long-term renovation plan for each building, recommending the most suitable solutions for energy savings and carbon emission reduction.
- They offer a data-driven guide for building owners and investors to plan the renovation process.

Purpose of Building Renovation Passports

- To ensure the gradual improvement of buildings' energy efficiency.
- To offer residential and commercial building owners the ability to better plan their renovation processes.
- To promote investments in energy efficiency and reduce carbon emissions.
- To accelerate sustainable renovation processes by digitalizing building performance data.



3.3. Building Renovation Passports

Content and Functioning of Building Renovation Passports

Building Renovation Passports include a comprehensive building assessment and a customized renovation plan:

- **Current Energy Performance Analysis:** The building's current level of energy efficiency is determined.
- **Proposed Renovation Measures:** Steps such as insulation, heating, cooling, and integration of renewable energy systems are proposed for the building.
- **Investment and Cost Analysis:** Renovation costs and long-term savings are calculated.
- **Timeline:** A feasible renovation schedule is created based on the building owner's budget and building usage.
- **Monitoring of Outcomes:** The effectiveness of renovations is tracked, and building performance is continuously updated.

Benefits of Building Renovation Passports

- Facilitates informed decision-making for building owners.
- Increases the cost-effectiveness of energy efficiency investments.
- Accelerates the decarbonization of the building stock.
- Promotes sustainable building renovations.
- Supports the European Green Deal's target of a climate-neutral building sector by 2050.



3.4. Energy Efficiency Directive

The Energy Efficiency Directive (EED) is one of the core legal frameworks at the center of the European Union's efforts to reduce energy consumption and carbon emissions in buildings. Addressed within the scope of the European Green Deal, the directive has been integrated with the Fit for 55 package and the REPowerEU Plan to support the EU's goal of becoming carbon neutral by 2050. Initially adopted in 2012, the directive was revised in 2018 and 2023. Its latest version was officially adopted on 24 July 2023.

Key Provisions and 2023 Updates

- **Mandatory Energy Savings Targets:** Member States are required to achieve an annual energy savings rate of 1.49% in final energy consumption between 2024 and 2030.
- **Obligations for the Public Sector:** At least 3% of the total floor area of public buildings must be renovated each year in terms of energy performance. All public entities are required to purchase energy-efficient products, services, and buildings.
- **Addressing Energy Poverty:** For the first time, a definition of energy poverty has been introduced. Member States are required to prioritize energy efficiency improvements for vulnerable customers and low-income households.
- **Obligations for the Private Sector:** Companies with an annual energy consumption exceeding 85 Terajoules (TJ) are required to implement an energy management system. Those consuming more than 10 TJ annually and not implementing such a system must undergo an energy audit.



3.4. Energy Efficiency Directive

Alignment of the Building Sector with the Energy Efficiency Directive and the European Green Deal

The Energy Efficiency Directive (EED) has been aligned with the core objectives of the European Green Deal to ensure its implementation in the building sector:

- **Reducing Greenhouse Gas Emissions:** In the EU, buildings account for 40% of total energy consumption and 35% of energy-related greenhouse gas emissions. In this context, the directive aims to promote building renovations to reduce energy consumption.
- **Reducing Fossil Fuel Dependence:** The EED supports the gradual phase-out of fossil fuels in the building sector and the increase of renewable energy use.
- **Integration with the Renovation Wave:** Launched in 2020, the Renovation Wave Strategy aims to double the renovation rate of buildings and prioritize the worst-performing ones.
- **Energy Independence through the REPowerEU Plan:** The EED is directly linked to the REPowerEU Plan, which seeks to reduce dependence on fossil fuel imports from Russia and enhance energy security.



3.5. Minimum Energy Performance Standards (MEPS)

Minimum Energy Performance Standards (MEPS) refer to the lowest acceptable levels of energy consumption and performance established for buildings, electrical appliances, and industrial equipment.

In the context of the building sector, these standards are defined to improve the energy efficiency of both existing buildings and new constructions, reduce carbon emissions, and decrease overall energy consumption. Under the European Union's Fit for 55 package, MEPS regulations have been tightened through the Energy Performance of Buildings Directive (EPBD).

IMPACTS AND IMPLEMENTATION OF MEPS IN THE BUILDING SECTOR

Mandatory Renovation of Existing Buildings:

Buildings with the lowest energy performance must be renovated to meet the specified energy efficiency criteria.

By 2027, the worst-performing buildings (e.g., energy class G) must be upgraded to at least energy class F.

By 2030, all buildings are expected to reach a minimum of energy class E.

Stricter Standards for New Buildings:

As of 2030, all new buildings must be zero-emission.

For public buildings, this requirement will take effect starting in 2028.



Impacts on Building Users:

Buildings with higher energy efficiency will result in lower energy bills.

Property owners will need to place greater emphasis on energy performance certificates (EPCs) during rental or sale processes.

Financial Incentives and Support:

The EU will provide various funds and grants to support renovations in compliance with MEPS.

Building owners investing in energy efficiency measures will be eligible for low-interest loans and incentives.

3.5. Minimum Energy Performance Standards (MEPS)

Impact of MEPS on Energy-Efficient Renovations

1. Gradual Improvement of Low-Performance Buildings

- As of 2027, compliance with specific energy performance standards will be mandatory for public and commercial buildings.
- By 2030, it is targeted to renovate the bottom 15% of the building stock in terms of energy efficiency.
- Financial incentives are offered to building owners for investments in energy efficiency measures.

2. Alignment with Energy Performance Certificates (EPCs)

- MEPS are directly linked to energy performance certificates (EPCs).
- By defining the energy classes of buildings, MEPS mandate the improvement of inefficient buildings.
- While newly constructed buildings are required to meet higher energy classes, the renovation of existing buildings is being accelerated.

3. Regulations Introducing Mandatory Renovation Requirements

- Buildings with low energy performance must be upgraded to a certain level before they can be sold or rented.
- During the renovation process, building owners are provided with low-interest green loans and subsidies.
- Government-supported renovation programs are offered for low-income households.

4. Impact on Reducing Building Energy Consumption and Carbon Emissions

- MEPS accelerate energy-efficient building renovations and support the EU's goal of achieving a zero-emission building stock by 2050.
- They help reduce the use of fossil fuels in the building sector and increase the integration of renewable energy sources.
- They also promote the use of more efficient systems for heating, cooling, and lighting needs in buildings.



3.6. Regulations and Sustainability

Under the European Green Deal, new sustainability standards and energy performance requirements have been introduced for the building sector. These legal regulations include binding provisions aimed at making new buildings zero-emission and accelerating the sustainable transformation of existing buildings.

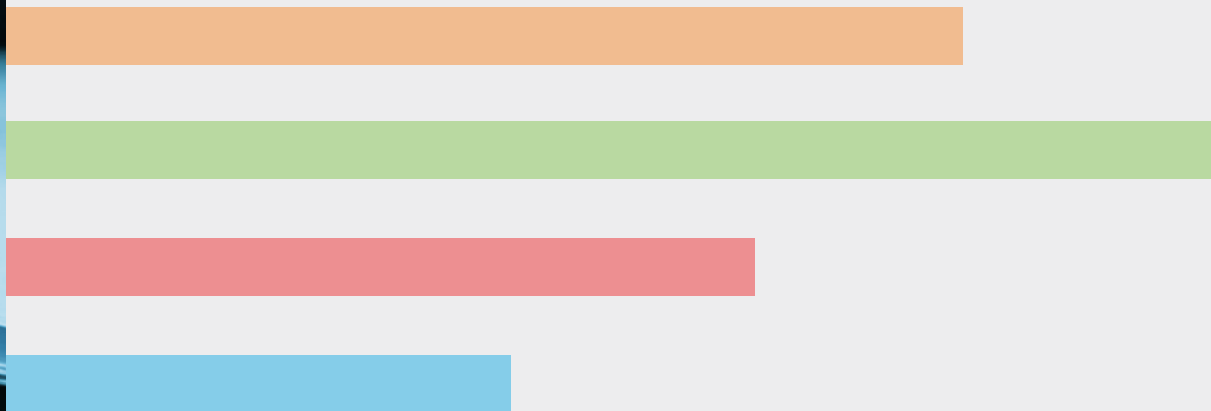
- All new buildings will be required to be zero-emission by 2030.
- Existing buildings must be gradually transformed to achieve zero carbon emissions by 2050.
- New regulatory frameworks are phasing out the use of fossil fuels in buildings and promoting the integration of renewable energy sources.
- Climate-resilient building design has been made mandatory.





Section 4

FINANCING AND INCENTIVES FOR THE BUILDING SECTOR



4.1. Financial Mechanisms for Buildings under the European Green Deal

Within the scope of the European Green Deal, various financial mechanisms have been developed to support the decarbonization of the building sector and enhance energy efficiency. These mechanisms are implemented to accelerate renovation projects, provide support to the public and private sectors, and promote sustainable investments.

NextGenerationEU and the **EU Recovery and Resilience Facility (RRF)** are among the largest financial resources supporting the green transformation of the building sector. The EU's **Green Financing Programs** encourage energy-efficient renovations by providing building owners with low-interest loans, grants, and subsidies [10,11].

Private funds are also directing investors and developers towards constructing zero-emission and energy-efficient buildings.



4.1. Financial Mechanisms for Buildings under the European Green Deal

Programs	Objective	Scope
Social Climate Fund	To support building renovation and energy efficiency projects for low-income households and small businesses..	€86.7 billion has been allocated for the period 2026–2032. Grants and low-interest loans are provided to combat energy poverty.
InvestEU Programme	To finance building energy efficiency projects by mobilizing private sector investments.	The goal is to mobilize over €1 trillion in private investment. Energy-efficient building projects and sustainable construction materials are supported.
Horizon Europe Programme	To promote the green transition of buildings through research and innovative solutions.	A €95.5 billion budget has been allocated for 2021–2027. R&D is supported for smart building management systems and innovative insulation technologies.
European Structure and Investment Fund	To provide support for energy efficiency projects in public buildings and housing across EU countries.	Funds are provided for regional development and building modernization across EU member states. Used for the green transition of public buildings.
European Investment Bank (EIB) Financing	To offer low-interest loans for private and public sector projects.	A target of €1 trillion in investments in energy-efficient buildings by 2030 has been set. Smart city solutions and green infrastructure investments are supported.
Revenues from the EU Emissions Trading System (EU ETS 2)	To channel revenues generated through carbon pricing in the building and transport sectors into green transition projects.	Under the new ETS 2, additional costs will be introduced for carbon emissions. Revenues collected will be directed towards renewable energy and building renovation projects.
LIFE Clean Energy Transition	To provide technical assistance and financial resources to accelerate the energy transition of buildings.	AB Grants are offered for low-carbon building projects across the EU. Funding is provided for energy cooperatives, municipalities, and the private sector.

4.1. Financial Mechanisms for Buildings under the European Green Deal

- **InvestEU Programme**
 - Encourages private investors and banks to provide financial support for sustainable projects.
 - Offers financial guarantees for building renovations and green construction projects.
 - Increases investments aimed at the development of energy-efficient buildings.
- **European Structural and Investment Funds (ESIFs)**
 - Provides financing to combat energy poverty and to improve energy efficiency in social housing projects.
 - Supports local building renovation projects within the framework of regional development programs.
 - Includes incentives for carbon-neutral building projects.
- **Green Bonds and Energy Efficiency Loans**
 - The EU promotes private sector investment in sustainable projects within the building sector through green bonds.
 - Banks and financial institutions offer low-interest loans for energy efficiency projects.
 - Subsidized loan packages are provided to building owners for renovations that deliver energy savings.



4.2. Renovation Wave Financing

Incentive mechanisms supported by EU and national funds stand out for building renovations and energy-efficient improvements. These funds aim to promote projects that reduce the carbon footprint of buildings and enhance energy efficiency.

Key Financing Mechanisms:

- **Grant Programs:** Provision of grants at specific rates for public and private sector projects.
- **Low-Interest Loans:** Loans offered in collaboration with private banks and financial institutions to encourage renovation projects.
- **Tax Incentives:** Tax reductions or exemptions for the use of energy-efficient materials and systems.
- **Energy Performance Contracts:** Financing models where investments are repaid through the savings generated from reduced energy costs.
- **Public-Private Partnerships (PPPs):** Collaborations between the government and the private sector for large-scale urban transformation and renovation projects.



4.3. Just Transition Mechanism (JTM)

- The Just Transition Mechanism (JTM) is a financing and policy tool established under the European Green Deal to support the transition of regions and sectors that are heavily dependent on fossil fuels towards a carbon-neutral economy.
- It aims to accelerate the economic transformation of vulnerable regions reliant on sectors such as coal, oil, and natural gas.
- By mitigating the social and economic impacts of the transition to a low-carbon economy, it supports employment and local development.
- It provides funding for energy efficiency, green jobs, and sustainable development projects in regions with industries based on fossil fuels.

AREAS SUPPORTED UNDER THE JTM

▪ Transformation of High-Emission Regions

- Funding is provided to decarbonize regions dependent on coal mining, heavy industry, and energy production.
- New, sustainable employment opportunities are created in these areas to promote economic diversification.

▪ Employment and Workforce Transition

- Training and reskilling programs are supported for workers affected by the decline of the fossil fuel sector.
- New job opportunities are fostered in the fields of green energy, energy efficiency, and sustainable industries.

▪ Financial Support for SMEs and Start-ups

- Financing is made available for SMEs operating in green innovation, energy-efficient technologies, and the circular economy.
- Special incentives are offered to start-ups and small businesses to promote regional development.

▪ Green Infrastructure Investments

- Financial resources are allocated for regional heating systems, renewable energy projects, and energy efficiency initiatives.
- Funding is provided to local authorities to support sustainable transport projects and low-carbon industrial initiatives.

▪ Social Support to Reduce Energy Bills

- Subsidies for building renovations are offered to low-income households.
- Community support mechanisms are developed to combat energy poverty.

4.3. Just Transition Mechanism (JTM)



The Just Transition Mechanism consists of three main financial instruments:

1. Just Transition Fund (JTF)

- With a budget of 17.5 billion Euros, the JTF provides direct funding to the regions most affected by the transition to a carbon-neutral economy.
- It supports projects focused on job creation, sustainable development, and energy efficiency.

2. Public and Private Sector Investments Aligned with the Just Transition Planning

- Projects financed by the EU budget and national contributions from member states are supported.
- Research, development, and innovation investments aimed at the green transformation of industry are encouraged.

3. InvestEU Programme and European Investment Bank Loans

- Low-interest loans are offered to attract private sector investments.
- Long-term financing models are implemented to support regional development.

4.4. Green Bonds and Building Finance

Green bonds are debt instruments used to finance environmental and sustainable projects. They have become a key financial tool to support energy-efficient initiatives in the building sector.

- Under the European Green Deal, the green bond market is rapidly expanding to boost sustainable investments in buildings.
- The EU is promoting the use of green bonds to increase financing for high energy-efficiency buildings by 2030.
- Green bonds stand out as a mechanism that channels both public and private sector investments into making buildings more sustainable.

USING GREEN BONDS TO FINANCE ENERGY-EFFICIENT PROJECTS

- **Financing New Zero-Emission Buildings**
 - Investments are directed toward projects that promote the construction of zero-emission and passive buildings.
 - As all new buildings in the EU are expected to be zero-emission starting from 2030, the issuance of green bonds for such projects is increasing.
- **Improving the Energy Efficiency of Existing Buildings**
 - Financing is provided for the renovation of buildings with poor energy performance.
 - Long-term green bond support is offered for deep renovations of public buildings.
- **Green Transition in Heating and Cooling Systems**
 - To reduce fossil fuel use, financing is allocated to district heating systems and heat pumps.
 - Green bonds support investments in geothermal and solar-powered heating technologies.
- **Smart Buildings and Digital Energy Management**
 - Funding is available for smart building management systems and energy optimization technologies.
 - R&D investments are supported for innovative solutions that minimize buildings' energy consumption.
- **Circular Economy in Building Materials**
 - Financial support is provided for investments in low-carbon and recyclable construction materials.
 - Green bonds promote the production of sustainable building materials.

4.4. Green Bonds and Building Finance



THE IMPACT OF THE GREEN BOND MARKET ON BUILDING FINANCE

Green bonds are debt instruments issued to finance sustainable projects and serve as a vital funding source for energy efficiency, carbon-neutral transformation, and sustainable construction in the building sector.

- Encourage public and private investment in sustainable buildings.
- Provide low-cost green loans to homeowners and developers.
- Help mainstream sustainability certifications in the building sector.
- Contribute to the EU's 2050 carbon neutrality targets.

4.5. Emissions Trading Systems (ETS) and Buildings

The Emissions Trading System (ETS) is a market-based mechanism developed by the European Union to reduce greenhouse gas emissions. It allows companies to buy and sell carbon credits to ensure they remain within set emission limits.

- Starting in 2026, the ETS will be expanded to include the building and transport sectors for the first time.
- This expansion will directly impact carbon pricing for building owners, tenants, and developers, accelerating the shift to low-emission buildings.
- As the cost of carbon-intensive energy sources rises, energy-efficient buildings will become increasingly attractive.

THE ROLE OF CARBON PRICING IN PROMOTING LOW-EMISSION BUILDING DESIGN

One of the key impacts of ETS on the building sector is the promotion of low-emission designs through carbon pricing.

1. Increasing Energy Costs for Building Owners and Tenants

- Buildings heated with fossil fuels and those with low energy performance will face higher energy costs due to rising carbon prices.
- This situation will encourage building owners to adopt lower-carbon solutions.

2. The Financial Appeal of Renovations and Zero-Emission Buildings

- Buildings with a lower carbon footprint will not be directly affected by carbon pricing, making them more economical for investors in the long term.
- Buildings using heat pumps, district heating, and renewable energy systems will be more advantageous compared to fossil fuel-based ones.

3. Compliance with Green Building Standards

- The inclusion of the building sector in the ETS mechanism will encourage stricter energy performance certifications and the spread of zero-emission buildings.
- In line with new building regulations and Minimum Energy Performance Standards (MEPS), low-emission designs will become mandatory.

4. Carbon Reduction Strategies for Companies and Public Buildings

- Under the ETS, large commercial and public buildings will be required to develop projects aimed at reducing carbon emissions.
- Investments in smart building technologies and energy-efficient systems will reduce long-term carbon costs.

4.6. Energy Efficiency Obligation Schemes (EEOS)

Energy Efficiency Obligation Schemes (EEOS) are regulatory mechanisms that impose specific energy savings targets on energy suppliers or distribution companies to enhance energy efficiency in the building sector. Implemented under the European Union's Energy Efficiency Directive (EED), EEOS is a key instrument, particularly aimed at promoting building renovations and increasing investments in energy-saving measures.

- Energy suppliers are required to provide financial support to building owners in order to meet the set energy efficiency targets.
- These schemes accelerate investments aimed at reducing buildings' energy consumption and promote the widespread adoption of low-carbon technologies.
- Building owners and businesses that implement energy efficiency measures can benefit from subsidies and incentives under these programs.



THE ROLE OF EEOS IN BUILDING RENOVATIONS

Energy Efficiency Obligation Schemes direct building owners and energy suppliers toward projects that deliver energy savings. Electricity, natural gas, and district heating providers are obligated to offer financial support for insulation, energy-efficient windows and doors, smart building systems, and low-carbon heating solutions.

Subsidies and low-interest loans are offered for low-income households, while the modernization of older buildings and compliance of public buildings with energy regulations are also encouraged. EEOS shifts building owners away from fossil fuels and toward solutions such as heat pumps, district heating, and renewable energy systems. It also supports the widespread adoption of smart building systems and energy-efficient lighting technologies. By reducing energy costs, the program helps lower carbon emissions and supports Europe's 2050 carbon neutrality target.

4.7. Financial Instruments for Homeowners and Developers



Although energy-efficient renovations require high upfront costs for both homeowners and developers, they offer significant long-term benefits in terms of energy savings and sustainable development. To support this transition, the European Union and various financial institutions provide a range of financial instruments, including low-interest loans, subsidies, green bonds, and public-private partnerships. These financing options encourage homeowners to adopt energy-efficient solutions while offering developers the opportunity to implement sustainable projects.

OVERVIEW OF FINANCIAL OPTIONS FOR ENERGY-EFFICIENT RENOVATIONS

1. Low-Interest Green Loans

- Banks and financial institutions offer low-interest green loans for energy-efficient building projects.
- Financing is provided for renewable energy systems, insulation upgrades, and smart building technologies.

2. EU Grants and Incentive Programs

- EU funds such as NextGenerationEU, European Structural and Investment Funds (ESIF), and Horizon Europe provide financing for building renovations.
- Energy efficiency subsidies are available for public buildings, social housing, and low-income households.

3. Energy Performance Contracts

- Public-private partnerships allow building owners to undertake renovations without upfront costs.
- Energy service companies (ESCOs) finance the investment on behalf of the building owners and are repaid through the achieved energy savings.

4. Green Bonds and Sustainable Financing Models

- Green bonds are used as a financing source for large-scale real estate projects and developers.
- Companies and investors issue bonds to provide long-term financing for green building projects.

5. Energy Cooperatives and Community Financing

- Local communities and energy cooperatives enable building owners to jointly invest in renewable energy projects.
- Community financing particularly supports solar energy systems and shared heating projects.

4.8. Public-Private Partnerships for Building Renovations

Public-Private Partnerships (PPPs) are a model based on collaboration between the public and private sectors in building renovation projects, combining financial and technical resources. This model offers sustainable financing and management solutions, particularly for large-scale energy efficiency projects and the renovation of public buildings.

The Role of PPPs in Scaling Up Renovation Efforts

- The public sector accelerates the renovation process by leveraging the investment capacity of the private sector.
- The private sector gains long-term returns by investing in low-carbon and energy-efficient building projects.
- The PPP model enables the large-scale implementation of renovation projects by making effective use of limited public funds.

By bringing together financing, technology, and operational expertise, PPPs reduce the costs of building renovations while enhancing energy efficiency and supporting sustainable development.

Country	Project Name	Benefits Provided by the PPP Model
Germany	Berlin Energy Efficiency Program	The PPP model was used to improve the energy efficiency of public buildings in Berlin. Private investors implemented energy-efficient solutions, reducing costs and saving energy.
France	Dijon Smart City and Building Renovation Project	In Dijon, energy-efficient lighting and heating systems were installed in public buildings. The PPP model accelerated the transition to renewable energy sources.
Spain	Madrid Regional Public Building Renovations	The Madrid administration partnered with private investors through a PPP to reduce energy consumption in public buildings. Insulation, heat pumps, and smart building systems were applied.
Netherlands	Energy Positive Schools Program	Through the PPP model, extensive renovations were carried out to make schools energy-positive. Solar panels, smart building automation, and energy-efficient lighting systems were integrated.

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