



Hi-EduCARBON



Co-funded by the  
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Determining the greenhouse gas emissions and removals on the level of product

Building materials and building services

TRAINING PROGRAM

**Regulations and actions for climate change reduction**

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## PROJECT MANAGEMENT

***Support of higher education system in a context of climate change mitigation through regional-level of carbon footprint caused by a product, building and organization***

***Grant Agreement No. 2021-1-SK01-KA220-HED-000023274***

# Project partners



TECHNICAL UNIVERSITY OF KOŠICE  
Faculty of Civil Engineering



Universitat d'Alacant  
Universidad de Alicante



**TECHNICAL  
UNIVERSITY**  
OF CLUJ-NAPOCA  
ROMANIA







**Faculty of Building Services Engineering**



UZHGOROD NATIONAL  
UNIVERSITY  
FACULTY OF CHEMISTRY



## REGULATIONS AND ACTIONS FOR CLIMATE CHANGE REDUCTION

-  GENERAL ASPECTS
-  EUROPEAN CONTEXT
-  CONTEXT IN ROMANIA
-  CONTEXT IN SLOVAKIA ???
-  CONTEXT IN SPAIN ???
-  CONTEXT IN UKRAINE ???







## REGULATIONS AND ACTIONS FOR CLIMATE CHANGE REDUCTION. GENERAL ASPECTS



**Global warming** is the phenomenon of the long-term warming of the planet's overall temperature, observed since the preindustrial period (1850-1900) due to human activities



**Climate change** refers to both human and naturally produced warming and its impacts on our planet – measured as the average increase in Earth's global surface temperature



**The impact of climate change** can be seen through extreme weather events



A view of the leading edge of the remaining part of the Larsen B ice shelf that extends into the northwest part of the Weddell Sea <https://www.theguardian.com/>



Floodwaters from Hurricane Katrina caused widespread devastation to the city of New Orleans, Louisiana, in 2005 <https://www.theguardian.com/>



Islands swallowed by water – Islands in the Tuvalu archipelago <https://www.theguardian.com/>



## REGULATIONS AND ACTIONS FOR CLIMATE CHANGE REDUCTION. GENERAL ASPECTS

CO<sub>2</sub>  
REDUCTION

**Greenhouse gas (GHG) emissions** are considered the main cause of global warming/climate change



Power plants in Europe, such this coal power station in Germany  
<https://www.theguardian.com/>



Severe drought. Danube river. Romania.  
<https://www.globaltimes.cn/>

CO<sub>2</sub>  
REDUCTION

**The main challenge for the world's countries** - fighting the disastrous impact of climate change and limiting GHG emissions.



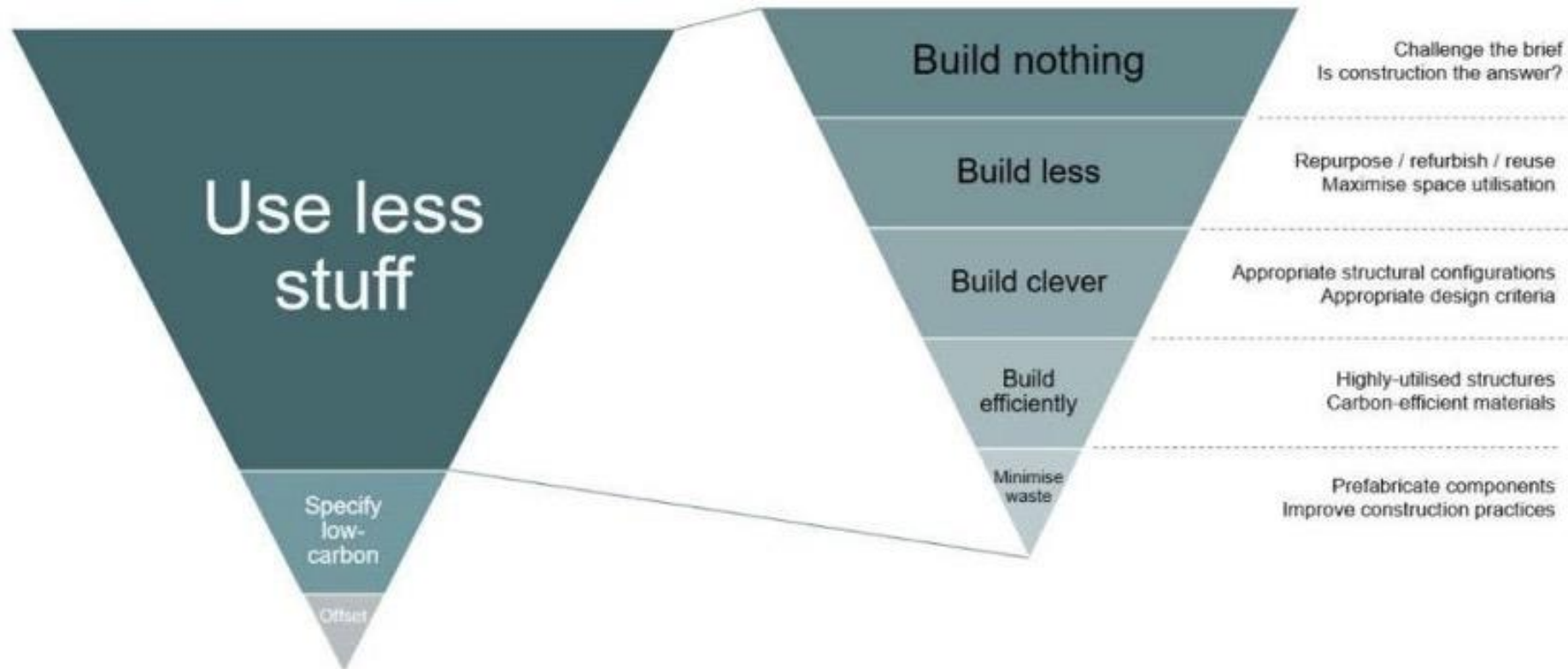
Wildfires in Spain, 2021.  
<https://www.dw.com/>



The Danube river, at a low water level due to drought.  
<https://www.globaltimes.cn/>



## The Key to Green Building is to Use Less Stuff







## Green building design program by University of British Columbia 2020

### **1st Stage: Program Planning and Site Selection**

- 1.1 Set preliminary environmental performance targets (owner)
- 1.2 Research funding opportunities
- 1.3 Reuse existing buildings
- 1.4 Start early to source salvaged materials
- 1.5 Select appropriate land





## Green building design program by University of British Columbia 2020

### **2nd Stage: Selection of Design Team**

- 2.1 Select a design team with experience or interest in green and integrated design
- 2.2 Select appropriate professionals for the expanded design team
- 2.3 Set environmental performance targets (design team)



**Green building design program by University of British Columbia 2020**

**3rd Stage: Site Design**

- 3.1 Protect or enhance site's ecological integrity and biodiversity
- 3.2 Reduce or eliminate disturbance to water system
- 3.3 Prevent or reduce the use of potable water for irrigation
- 3.4 Reduce urban heat islands
- 3.5 Design infrastructure to support alternative transportation



**Green building design program by University of British Columbia 2020**

**4th Stage: Building Orientation & Configuration**

- 4.1 Use site resources to reduce building loads and enhance indoor environmental quality
- 4.2 Develop a project specific building form and massing
- 4.3 Configure internal layout to reduce loads and enhance IEQ
- 4.4 Select best concept design
- 4.5 Finalize all non-energy performance targets





**Green building design program by University of British Columbia 2020**

**5th Stage: Building Systems Design**

5.1 Energy Design

5.2 Structure Design

5.3 Envelope Design

5.4 Ventilation Design

5.5 Water Systems Design

5.6 Lighting Design

5.7 Mechanical Design

5.8 Finalize building systems design



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**Green building design program by University of British Columbia 2020**

## **6th Stage: Interior Finishes and Appliances**

6.1 Reduce internal loads

6.2 Reduce disposal of waste materials to landfills

6.3 Ensure indoor air is free of pollution



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## Tax reduction in Cluj-Napoca for green buildings since 2012



### And the winner is...

#### **BINARIUM Business Center, Romania**

A 1950s factory in the centre of Cluj-Napoca stood empty for almost 15 years, until TACO Developments took on the challenge of transforming it sustainably. The regeneration adopted a circular approach, using cradle-to-cradle certified products, FSC certified wood, and durable materials, while the interior promotes biophilic principles with such features as abundant natural light and greenery. Today, the centre provides innovative and flexible workspace for tech and research-based businesses.

The judges particularly liked the strong focus of this project on taking advantage of the opportunities presented through a major urban regeneration project to deliver social enhancement. The degree of stretch and commitment from the client and project team was particularly impressive when compared to typical practice in the local market.



**AWARDS 2019  
WINNER**







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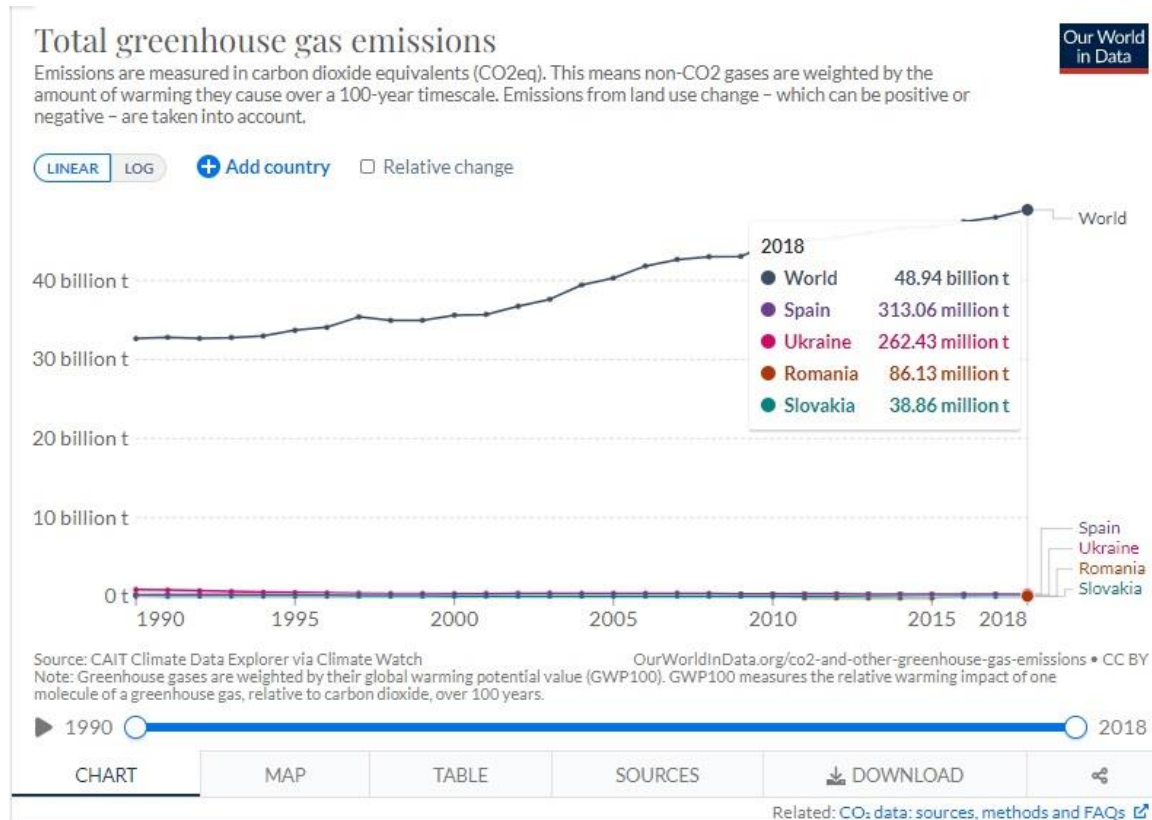
Professional Master in English since 2022

## Building Services for Regenerative Cities





## REGULATIONS AND ACTIONS FOR CLIMATE CHANGE REDUCTION. GENERAL ASPECTS





## REGULATIONS AND ACTIONS FOR CLIMATE CHANGE REDUCTION. GENERAL ASPECTS

### Global greenhouse gas emissions and warming scenarios

Our World  
in Data

- Each pathway comes with uncertainty, marked by the shading from low to high emissions under each scenario.
- Warming refers to the expected global temperature rise by 2100, relative to pre-industrial temperatures.

Annual global greenhouse gas emissions  
in gigatonnes of carbon dioxide-equivalents

150 Gt

100 Gt

50 Gt

Greenhouse gas emissions  
up to the present

0

1990 2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100

**No climate policies**  
4.1 – 4.8 °C

→ expected emissions in a baseline scenario if countries had not implemented climate reduction policies.

**Current policies**  
2.5 – 2.9 °C

→ emissions with current climate policies in place result in warming of 2.5 to 2.9°C by 2100.

**Pledges & targets (2.1 °C)**

→ emissions if all countries delivered on reduction pledges result in warming of 2.1°C by 2100.

**2°C pathways**  
**1.5°C pathways**

Data source: Climate Action Tracker (based on national policies and pledges as of November 2021).  
OurWorldinData.org – Research and data to make progress against the world's largest problems.

Last updated: April 2022.  
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## REGULATIONS AND ACTIONS FOR CLIMATE CHANGE REDUCTION IN EU



**UNFCCC** - general framework of measures to be taken to prevent the disastrous impact of climate change



**UNFCCC objective:** to stabilize greenhouse gas concentrations



**The Kyoto Protocol (1997)** - measures, targets and periods to reduce greenhouse gas emissions



## EU DIRECTIVES AND REGULATIONS

**DIRECTIVE 2011/92/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL** of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment;

**REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL** of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing;

**REGULATION (EU) No 525/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL** of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC

**DIRECTIVE (EU) 2016/2284 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL** of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC



## EU DIRECTIVES AND REGULATIONS

**DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL** of 19 May 2010 on the energy performance of buildings

**Regulation (EU) 2018/1999 of the European Parliament and of the Council** of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (Text with EEA relevance.)

**REGULATION (EU) 2021/1119 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL** of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law').



## REGULATIONS AND ACTIONS FOR CLIMATE CHANGE REDUCTION IN EU



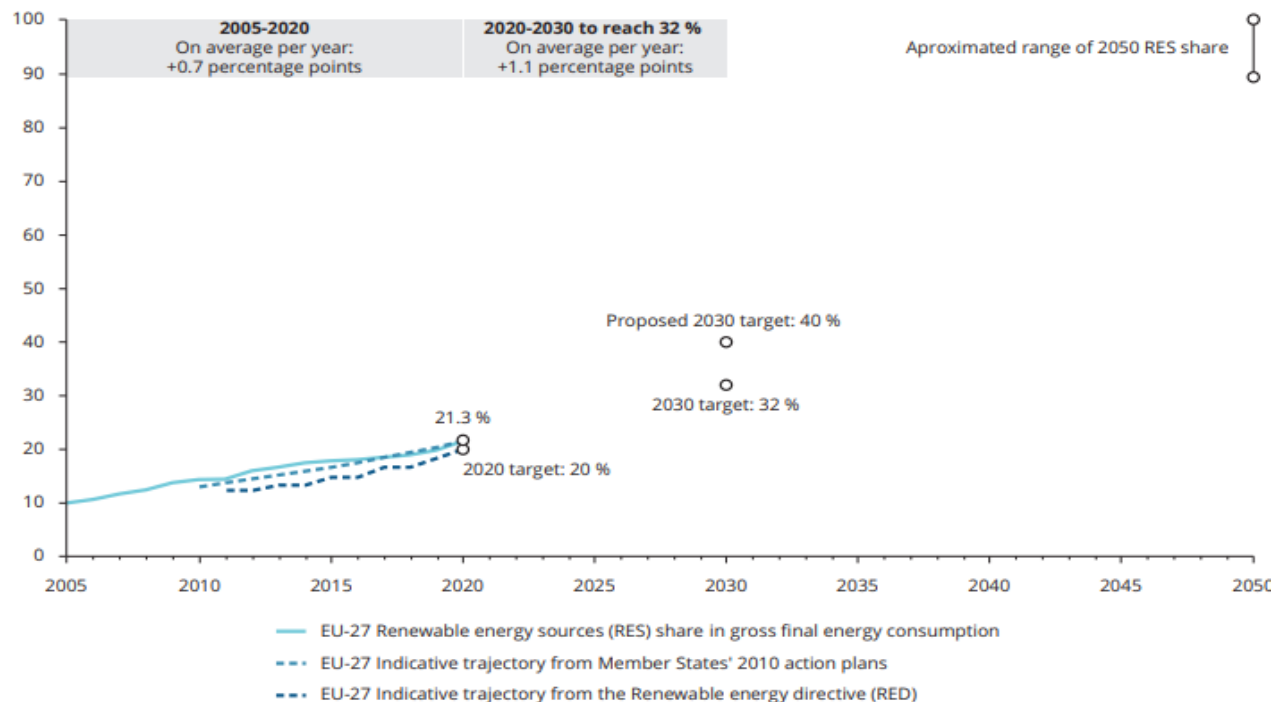
For 2020, European Union - three **climate and energy targets**  
(20-20-20 objectives)



According to European Environment Agency report from 2021,  
**EU fully achieved its three main climate and energy targets**

## REGULATIONS AND ACTIONS FOR CLIMATE CHANGE REDUCTION IN EU

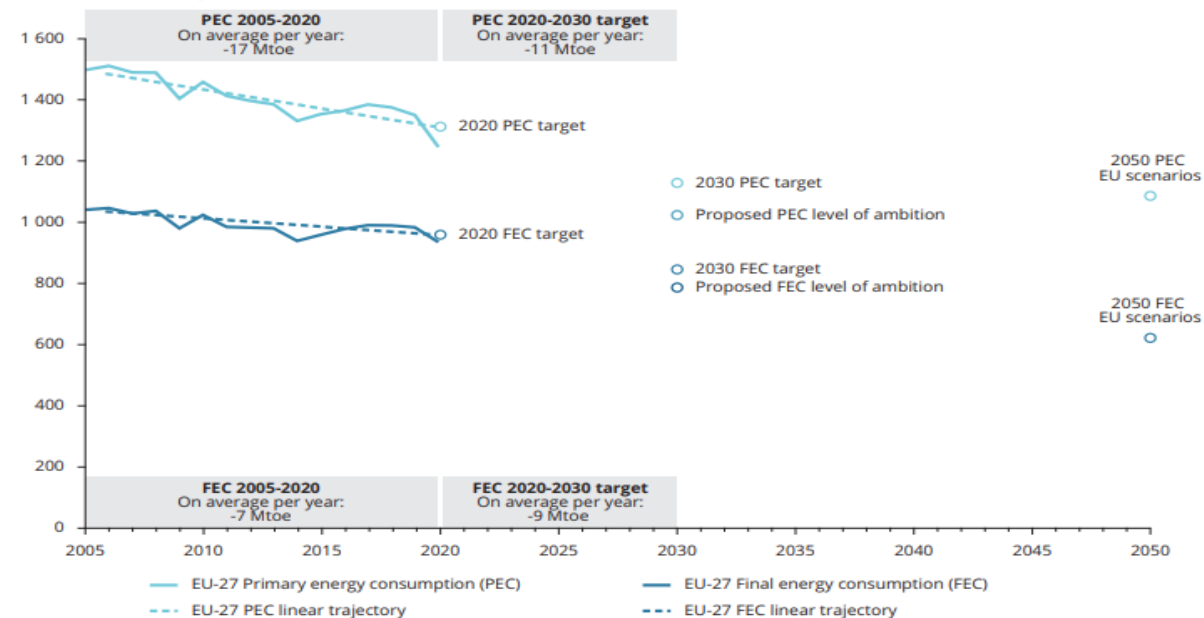
Percentage of RES share in gross final energy



**Note:** The current 2030 target, adopted from the Renewable Energy Directive (2018/2001/EU), is a 32 % renewable energy share of gross final energy consumption (RES share). The proposed target from the 'Fit for 55 package' is a more ambitious 40 % RES share in 2030. The 2050 values represent the indicative share of renewable energy in the EU's gross final consumption as presented in figures 5 and 8 in a Commission staff working document (EC, 2020a) of scenarios that achieve a reduction of at least 55 % in 2030.

**Sources:** EC (2020a, 2021e); EEA (forthcoming\_c); EU (2018); Eurostat (2021c).

Million tonnes of oil equivalent (Mtoe)



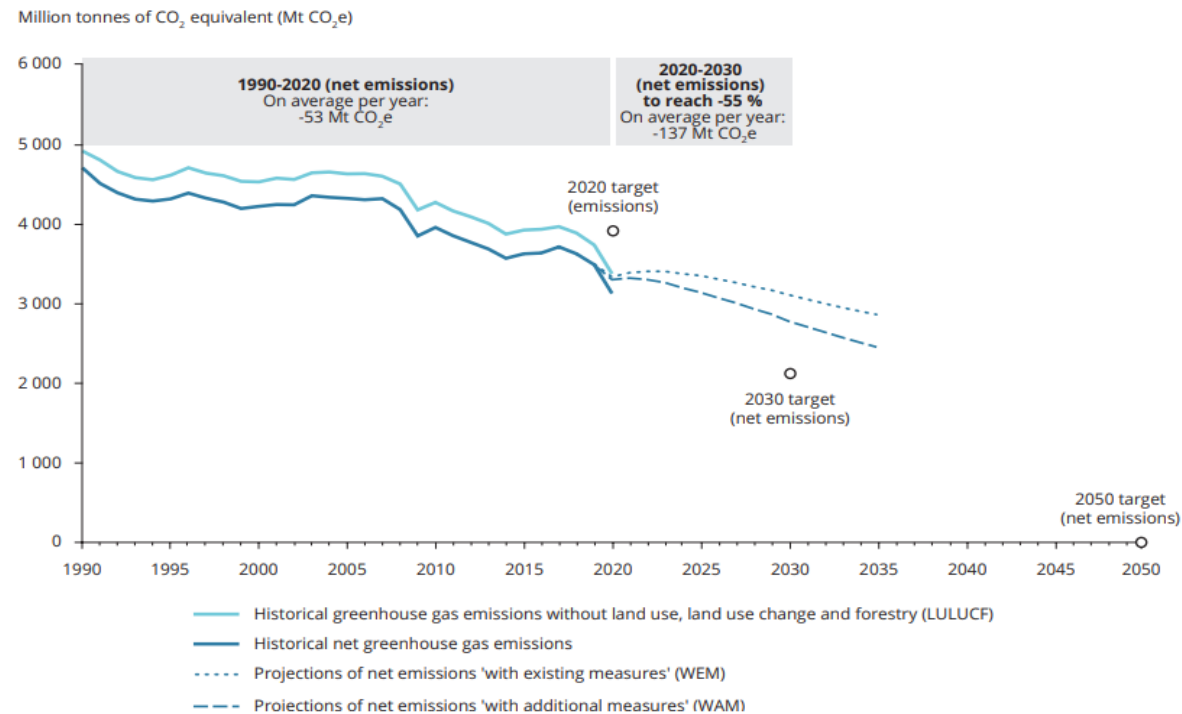
**Note:** FEC denotes final energy consumption, while PEC denotes primary energy consumption. The targets labelled '2030' reflect the current 2030 targets of an energy consumption reduction of at least 32.5 % compared with projected 2030 energy use. The proposed levels of ambition depict increased 2030 ambition with a 36 % reduction for FEC and a 39 % reduction for PEC (both compared with the 2007 reference scenario projection for 2030) but have not yet been agreed.

**Sources:** EC (2020a, 2021f); EEA (forthcoming\_a).





## REGULATIONS AND ACTIONS FOR CLIMATE CHANGE REDUCTION IN EU



**Note:** The historical development of greenhouse gas emissions is shown excluding land use, land use change and forestry (LULUCF) (light blue solid line, labelled 'emissions') and including LULUCF (dark blue solid line, labelled 'net emissions'). Both of these trend lines include approximated values for 2020. The light blue line relates to the scope of the 2020 target, while the dark blue line reflects the 2030 target's scope; both include international aviation. Projections are shown in dashed and dotted lines according to the 2030 target's scope, starting from 2019. The projections reflect the most recent data submitted by all Member States; Germany's projections are only preliminary. The pace notations in the bar at the top indicate the actual average annual change in net emissions (including LULUCF and international aviation) for 1990-2020. The necessary future change to achieve the net 55 % reductions between 2020 and 2030 is calculated on an average annual basis, assuming a maximum LULUCF contribution of 225 Mt CO<sub>2</sub>e (carbon dioxide equivalent) in 2030.

**Sources:** EEA (2021b, 2021d, forthcoming\_b).

## REGULATIONS AND ACTIONS FOR CLIMATE CHANGE REDUCTION IN EU

### 🌱 The European Green Deal → EU - a modern, resource-efficient and competitive economy:

- neutralizing net GHG emissions by 2050,
- ensuring economic growth without depleting resources,
- higher shares of renewable energy and greater energy efficiency,
- renovating buildings for greener lifestyle,
- improving the life and wellbeing of European citizens



- 🌱 **The aim of EU to be climate-neutral by 2050** - the main part of the European Green Deal and in line with the EU's objective to global climate action under the Paris Agreement to keep the global temperature increase to well below 2°C and pursue efforts to keep it to 1.5°C

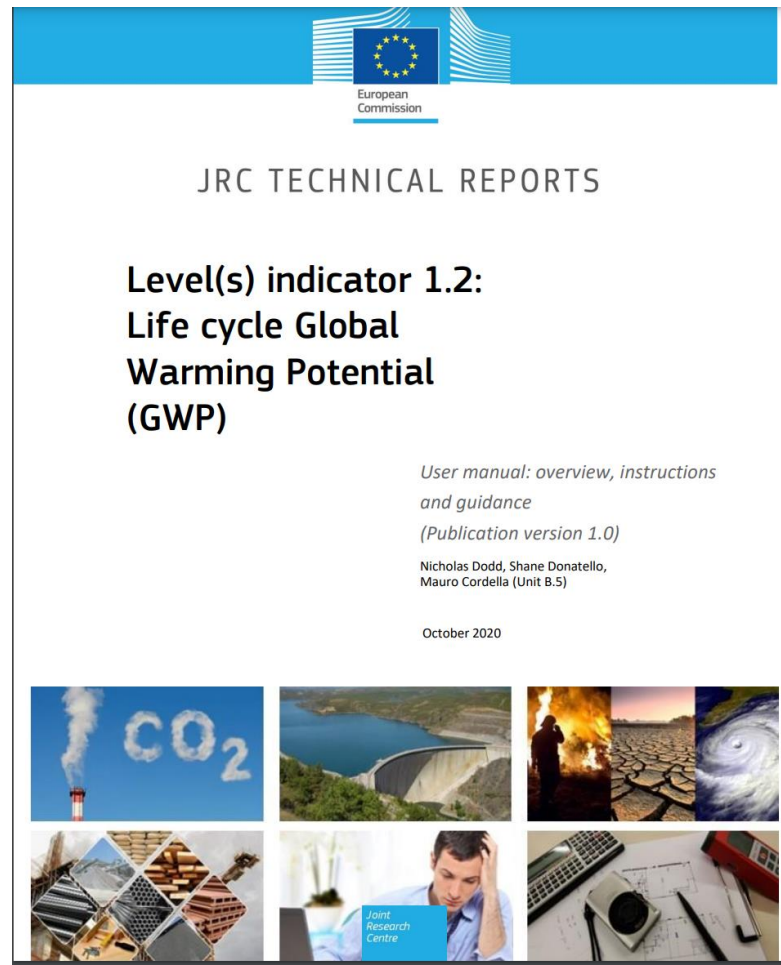


## REGULATIONS AND ACTIONS FOR CLIMATE CHANGE REDUCTION IN EU

### Target for 2030:

- to cut GHG emissions by at least 55% compared to 1990 level,
  - to improve energy efficiency by at least 32.5%
  - to increase the share of energy from renewable sources to at least 32%.
- To meet the commitments under Paris Agreement and EU objectives, EU Member States are required to adopt **National Energy and Climate Plans (NECPs) for the 2021-2030 period**
- national targets and contributions in terms of energy efficiency, renewable energy and greenhouse gas emission reductions.

## JRC Report: Life cycle Global Warming Report





## JRC Report: Indicators

### Life Cycle Analysis LCA as an indicator for sustainability

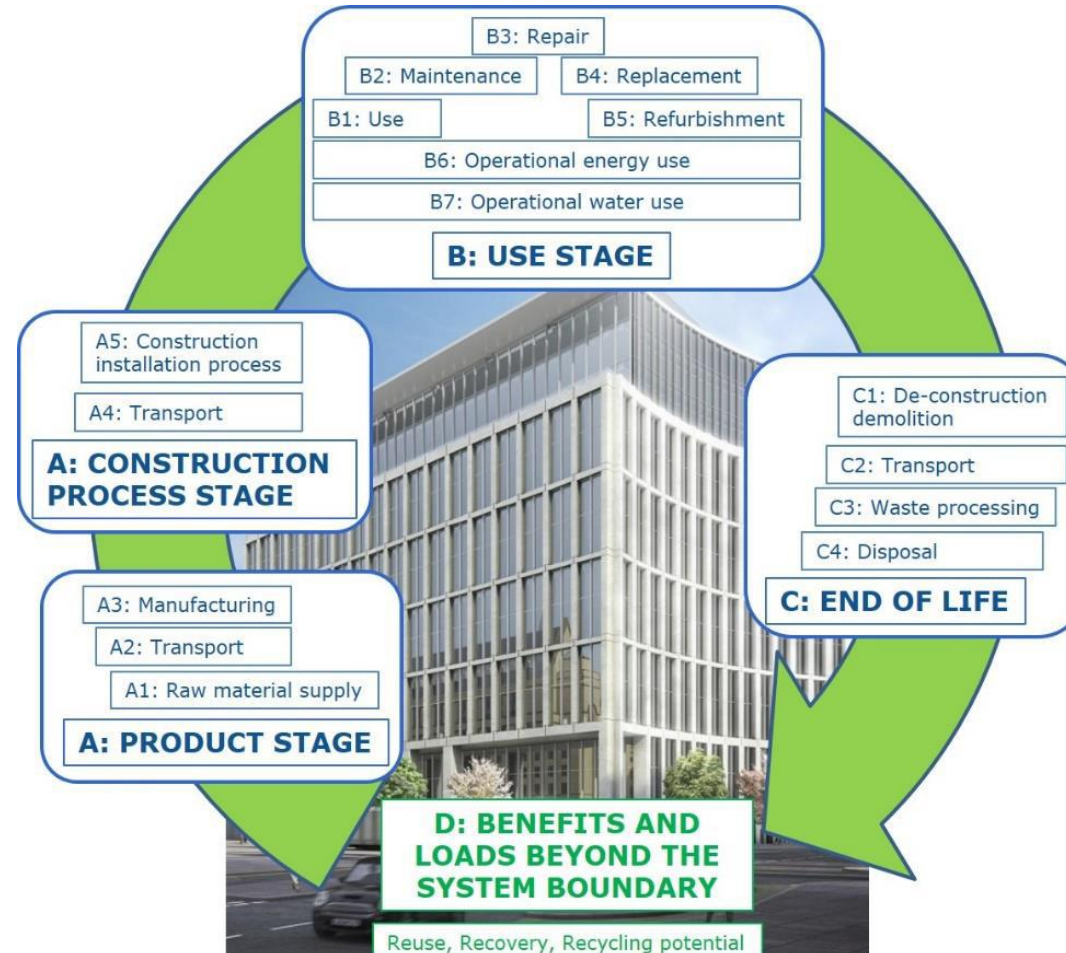
This indicator aims to quantify the Global Warming Potential (GWP) contributions of a building along its life cycle from the 'cradle' – the extraction of the raw materials that are used construction the building - through to the 'grave' – the deconstruction of the building and how to deal with its building materials (recovery, reuse, recycling and waste management).

It is intended to form a starting point for building professionals to, as far as possible within the scope of a project, to think about the whole life cycle and circularity of a building design from cradle to grave. Buildings are a significant material bank, being a repository for resources over many decades, and so it is important to design, construct, maintain and renovate using life cycle and circular thinking.





## Life Cycle stages





## Terms

Carbon storage - carbon removed from the atmosphere and stored as carbon in a product

Offsetting - mechanism for compensating for all or for a part of the carbon footprint through the prevention of the release of, reduction in, or removal of an amount of greenhouse gas emissions in a process outside the boundary of the product system





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**THANK YOU FOR YOUR ATTENTION!**