

***Sustainable Transformation of the Interaction between Economy-Society-Environment:
If you can't measure it, you can't manage it, and you can't improve it!***

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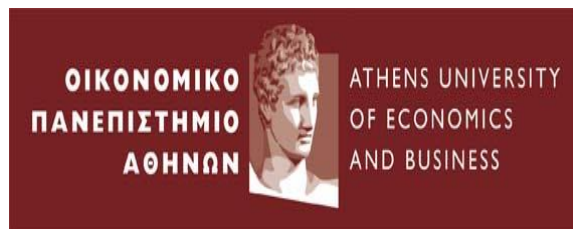
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Chair UN SDSN Global Climate Hub and UN SDSN European Hub

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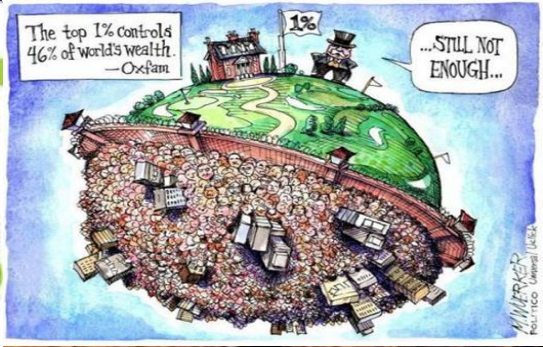
President European Association of Environmental and Resource Economists

President World Council of Environmental and Resource Economists

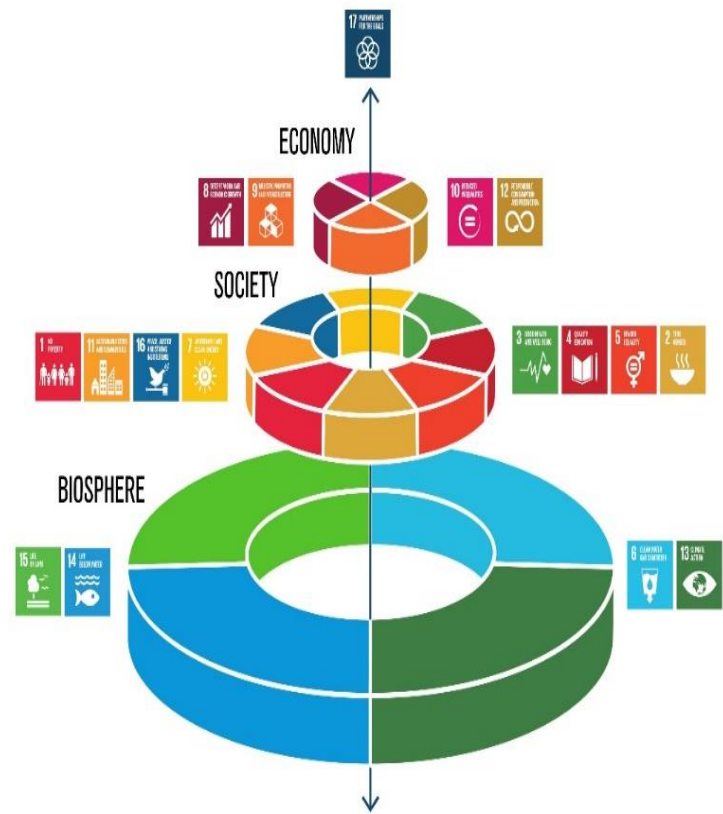


Technical
University of
Denmark





SUSTAINABLE DEVELOPMENT GOALS





200
PEOPLE



100
PROJECTS



150
CONFERENCES
ORGANIZED



543
PUBLICATIONS



500_M
FUNDING



Prof. Phoebe Koundouri
is the Founder and Scientific Chair of AE4RIA

Research and Innovation Centers



ReSEES Laboratory



Stochastic Modeling and
Applications Laboratory



Sustainable Development Unit
/ Athena



DTU Management Department
of Technology, Management
and Economics Climate and
Energy Policy Division



Brigaid Connect



MENA Maritime
Accelerator



Black Sea Accelerator



SDSN Global Climate
Hub



Climate-KIC Greece
Hub

Innovation Acceleration Hubs

Science - Policy Networks



SDSN



SDSN Europe



SDSN Greece



Water Europe



Nexus cluster

Scientific Associations and Academies



EAERE



WCERA



Academia
Europaea



World Academy of
Art and Science

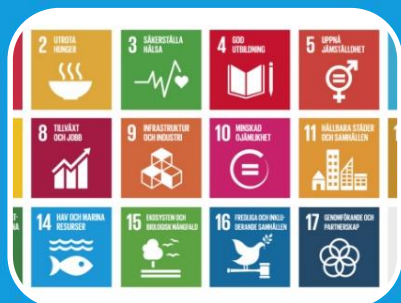
WAAS



IAP



European Academy
of Sciences and
Arts



SDGs – ESG
measurement

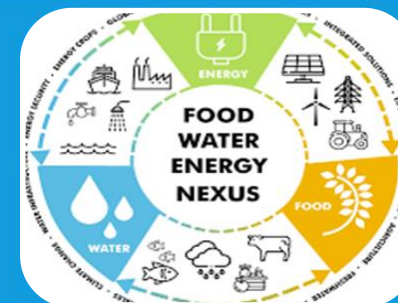
Sustainable Finance



Sustainable Pathways
Climate Neutrality
& Resilience



Sustainable Pathways
for Seas and Oceans



Sustainable Pathways
Land Use &
WFEB Nexus



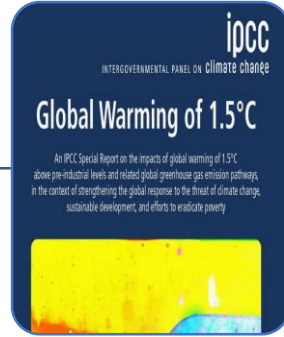
Innovation Acceleration
Education
Upskilling/Reskilling

Summary Policy Framework Green-Digital Transition

2015



2018



2019



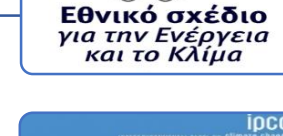
2020



Σχέδιο Ανάπτυξης για την Ελληνική Οικονομία
ΤΕΛΙΚΗ ΕΚΔΕΧΗ

"Next Generation EU"
Ελλάδα 2.0
ΕΘΝΙΚΟ ΣΧΕΔΙΟ ΑΝΑΚΑΜΨΗΣ ΚΑΙ ΑΝΘΕΚΤΙΚΟΤΗΤΑΣ

2021

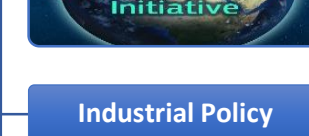
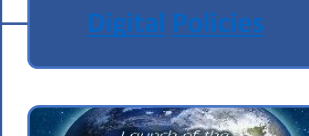


2022



Climate Delegated Act & Energy Prices

RePowerEU
Independence Russian Fossil Fuels
Supply Chain Security-Interconnectivity
Invest Renewables

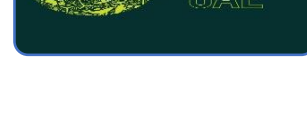


2023

New Law to Reduce Methane Emissions

Fit-for-55 Policy updates

European Green Deal updates



SDSN Europe
European Green Deal Senior Working Group

SDSN European Green Deal Senior Working Group



The Fit for 55 Package:

Transforming EU's Building Sector

- 1. Objective of Fit for 55:** Achieve a net reduction of greenhouse gas emissions by at least 55% by 2030, **targeting buildings as key contributors to energy consumption and CO2 emissions.**
- 2. Building Sector Challenges:**
 - Buildings account for ~40% of EU's total energy consumption.
 - Responsible for 36% of the EU's CO2 emissions.
- 3. Strategic Measures:**
 - Renovation Wave Strategy: Accelerate building renovations to improve energy efficiency.
 - Energy Performance of Buildings Directive (EPBD) Revision: Enforce stricter energy performance standards for new and renovated buildings.
- 4. Expected Impact:**
 - Increased renovation rates, enhanced energy performance in new buildings.
 - Substantial reduction in energy consumption and CO2 emissions from buildings.
- 5. Challenges and Opportunities:**
 - Adapting to stricter regulations and increasing renovation activity.
 - Leading to a more sustainable, energy-efficient built environment.



Built Environment - Laws in Greece

Law	Objective	Key Features	Impact
Energy Efficiency for Building (KENAK) – Law 4122/2013	Establish minimum energy performance standards for new and significantly renovated buildings to reduce energy consumption and CO2 emissions.	<ul style="list-style-type: none">• Mandatory energy certificates indicating buildings' energy performance levels.• Comprehensive inspections to ensure compliance.• Enforcement mechanisms for non-compliance.	Facilitates informed decisions for buyers/tenants, promotes energy-saving constructions.
New Building Code (Law 4495/2017)	Overhaul building regulations to streamline permitting processes and introduce stringent requirements for energy efficiency, accessibility, and earthquake resilience.	<ul style="list-style-type: none">• Simplified construction permitting to expedite development projects.• New standards for accessibility and seismic safety, reflecting Greece's geological challenges.• Established a modernized system for regular building inspections.	Aims to create safer, more accessible, and energy-efficient buildings enhancing societal well-being and sustainability.

Greece's Energy and Climate Strategy

1. Net Zero Emissions by 2050

1. **2030 Target:** 55% reduction in greenhouse gas emissions.
2. **2040 Target:** 80% reduction.
3. Phase-out of lignite-fired generation by 2028 - National Energy and Climate Plan (NECP) and the National Climate Law.

2. Current Energy Landscape

1. Fossil fuels remain predominant in Greece's energy supply.
2. Efforts are underway to align energy demand with emissions reduction targets.

3. Fossil Fuel Subsidies and Financial Plans

1. Subsidies still constitute over one-quarter of energy tax revenue, a high share within the OECD.
2. "Greece 2.0" recovery and resilience plan to the EU, requesting EUR 30.5 billion for energy efficiency and other initiatives.

4. Energy Security and Independence

1. Increased lignite stockpiling for energy security.
2. Enhanced focus on renewables and energy savings to reduce reliance on Russian energy.

5. Strategic Energy Infrastructure Developments

1. New floating storage unit at the LNG terminal to double LNG cargoes.
2. Construction of a new floating LNG terminal to nearly double Greece's LNG import capacity, reducing EU and national dependence on Russian energy imports.

Energy intensity of residential buildings in Greece

- **Total Energy Intensity for 2021:** This value is 0.46 GJ/m², which measures the energy consumption per square meter of residential buildings in Greece.
- **Trend:** 15% decrease in energy intensity from 2000 to 2021, suggesting improvements in energy efficiency.
- **Regional and Global Ranking:** 2021, Greece ranked 14th, with a lower energy intensity than The Netherlands (0.47 GJ/m²) and Germany (0.57 GJ/m²), but slightly higher than Switzerland (0.44 GJ/m²). The ranking suggests that Greece's residential buildings are relatively energy-efficient compared to some of its regional counterparts.

Energy intensity of residential buildings in Greece

Total, 2021

0.46

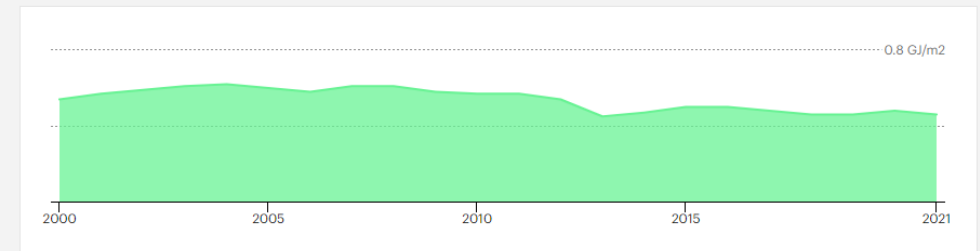
GJ/m²

Trend

↓15%

change 2000-2021

Residential energy intensity, Greece



SVG PNG CSV

Energy intensity of residential buildings, regional ranking, 2021

Regional ranking

Global ranking

Rank	Country/Region	GJ/m ²
-		
12	Germany	0.57
13	The Netherlands	0.47
14	Greece	0.46
15	Switzerland	0.44

Valuing Cultural Heritage of the Built Environment

Role of the Built Environment in Cultural Heritage

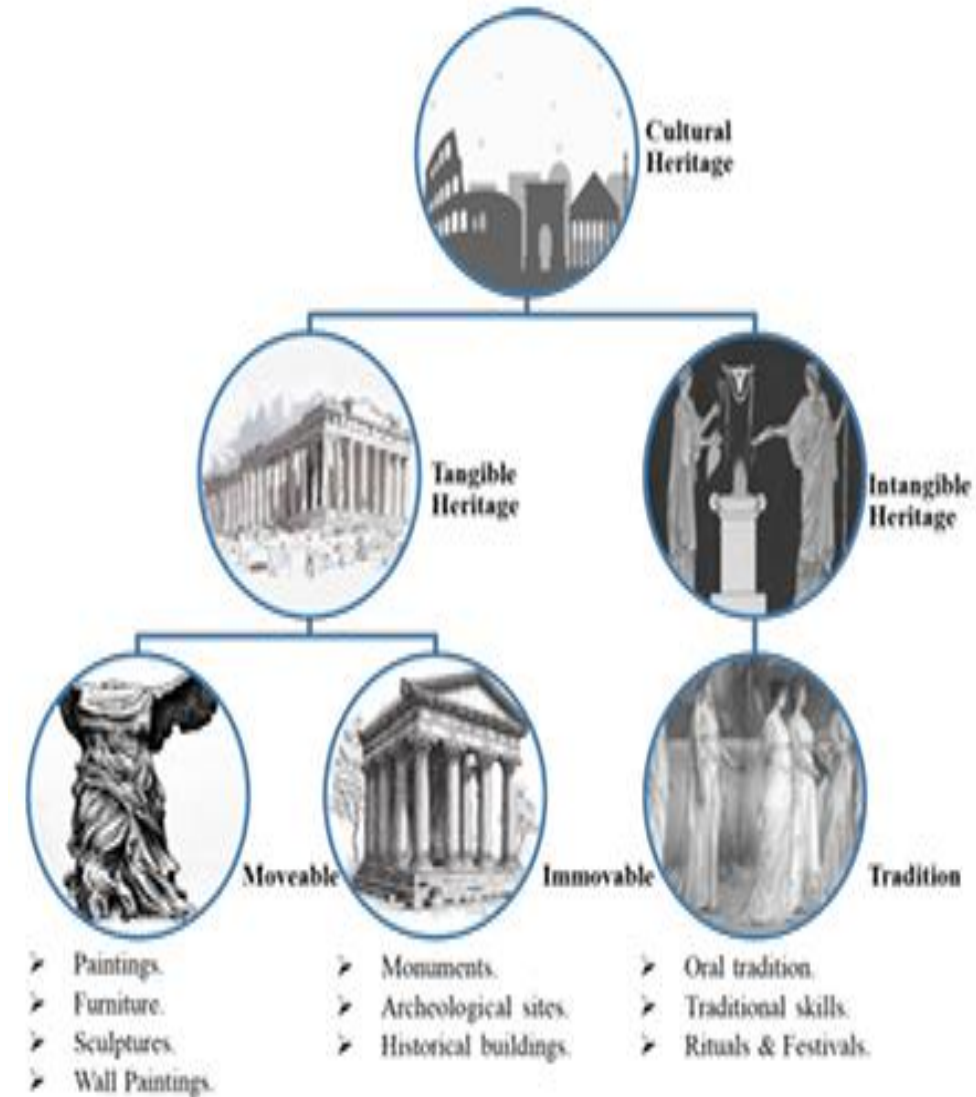
- **Tangible cultural** assets like buildings, monuments, and archaeological sites that encapsulate the values, traditions, and historical narratives of communities.
- Acts as a physical testimony to past achievements, architectural innovation, and the historical context of civilizations.

Importance of Protecting Cultural Heritage

- **Identity and Continuity:** Preserves the identity of communities and provides a sense of continuity in an ever-changing world.
- **Social and Economic Benefits:** Drives local and national economies through tourism, fosters social cohesion, and enhances the quality of life.
- **Knowledge and Education:** Offers educational resources, promoting understanding and appreciation of history, culture, and architecture.

Valuing Cultural Heritage for Sustainable Development

- **Economic Valuation:** Assigning economic value to cultural heritage through methodologies like willingness to pay (WTP) highlights its significance in economic planning and prioritization.
- **Informed Decision-Making:** Economic valuation informs policymakers about the societal importance of cultural heritage assets, guiding investments in conservation.
- **Resilience and Sustainability:** Understanding and valuing cultural heritage are crucial for developing strategies to protect these assets against threats like climate change and acid rain, ensuring their preservation for future generations.

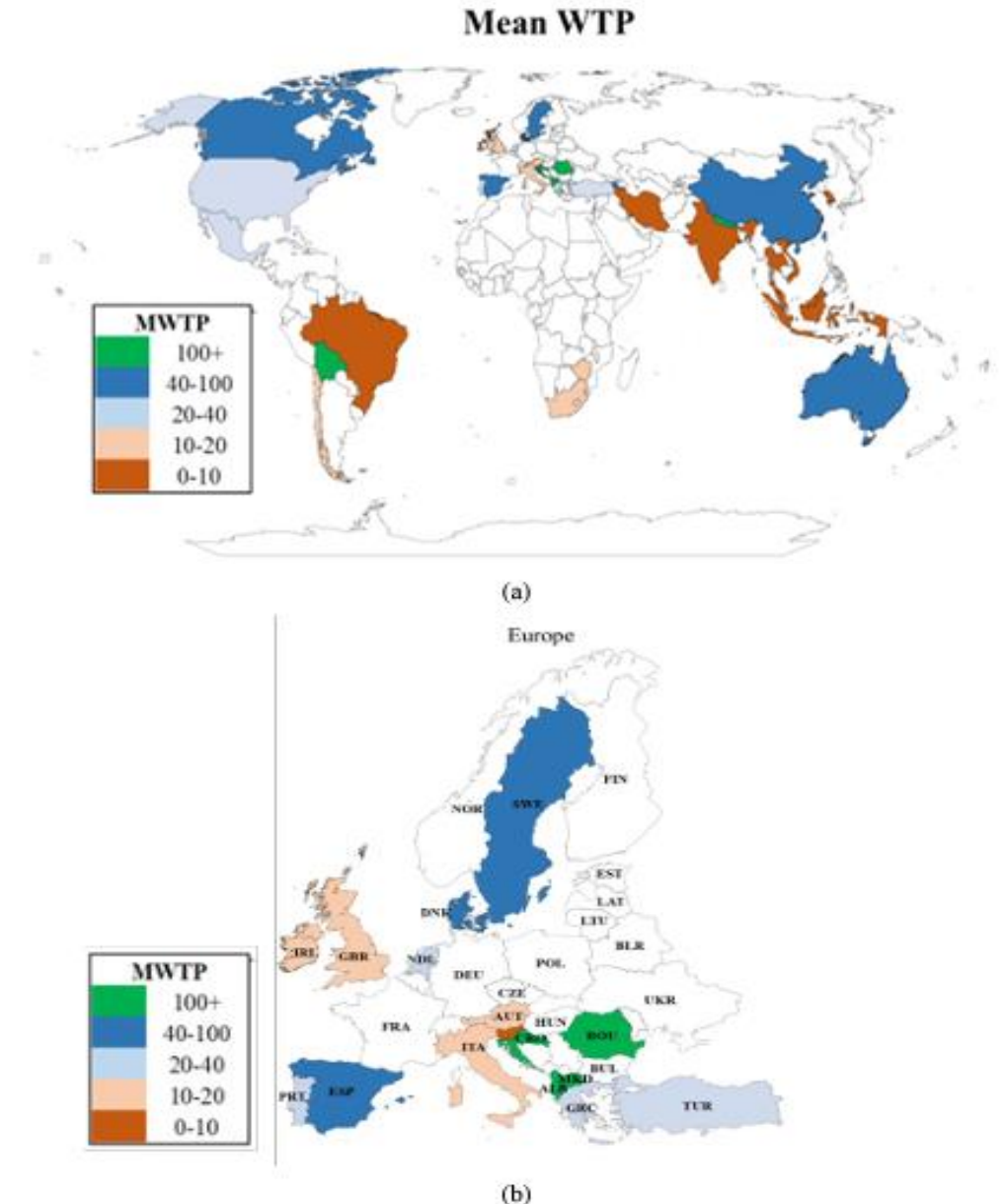


Source: Authors' elaboration inspired by UNESCO (2003).

Valuation of Cultural Heritage: European vs Non-European Perspectives

- Europeans have a lower willingness to pay (WTP) for cultural heritage preservation (**€37.6**) compared to non-Europeans (**€60.12**): regional differences.
- Most influential Parameters: Education, Income levels
- Europeans are more inclined **towards tangible cultural assets** (e.g., monuments, paintings) for their aesthetic and spiritual values, whereas non-Europeans value **intangible aspects**, like oral traditions, for their symbolic and social significance.

Fig. 4(a) Mean willingness to pay of the case studies and (b) the case of Europe.



Note: white colour indicates non availability of data.


Climate Change Impacts on Build Env

- **Structural Damage:** Rising temperatures, increased precipitation, flooding, and extreme weather events can cause physical damage to historic buildings, monuments, and archaeological sites, affecting their structural integrity and aesthetic value.
- **Material Degradation:** Climate change can accelerate the deterioration of materials used in the construction of cultural heritage sites, such as stone, wood, and metal, through processes like erosion, corrosion, and biological growth.
- **Sea-Level Rise:** Coastal heritage sites are at risk from sea-level rise, leading to erosion, submersion, and increased salinity, which can damage foundations and structural elements.
- **Altered Environmental Conditions:** Changes in temperature and humidity can affect the preservation of artifacts, indoor climate conditions in museums, and the overall conservation state of built heritage.

Adaptation Strategies on Build Env

- **Enhanced Conservation Techniques:** Developing and applying advanced conservation methods and materials that are more resilient to the effects of climate change
- **Protective Infrastructure:** flood defenses, improved drainage systems, and barriers to shield heritage sites from environmental threats.
- **Sustainable Restoration:** Adopting sustainable practices in the restoration and maintenance of historic buildings
- **Climate-Resilient Urban Planning:** Integrating cultural heritage conservation into urban planning, considering climate risks in the development of new projects and the adaptation of existing infrastructure.
- **Monitoring and Risk Assessment:** Establishing comprehensive monitoring systems to assess the condition of cultural heritage sites and identify risks early, enabling timely interventions.
- **Policy and Regulatory Frameworks:** Developing policies and regulations that support climate adaptation efforts for cultural heritage, including funding mechanisms for conservation projects and guidelines for managing climate impacts.
- **Community Engagement and Education:** Involving local communities in the preservation of cultural heritage, leveraging traditional knowledge, and raising awareness about the impacts of climate change and the importance of adaptation measures.






Climate Data
Platforms and Digital
Applications

Inter-disciplinary mathematical MODELLING: Mitigation and Adaptation Pathways

 DownScaling Climate Scenarios

 Energy System

 Lan-use & Marine-use Systems

 Health Systems

 Socio-Economic Systems

Intra-Disciplinary CO-DESIGN: Mitigation and Adaptation Pathways



Innovation
Incubation
Acceleration



Transformative
Participatory
Approaches

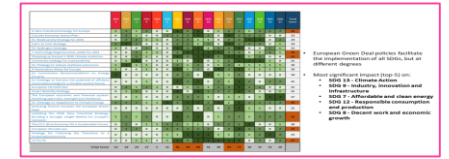


Education
Training

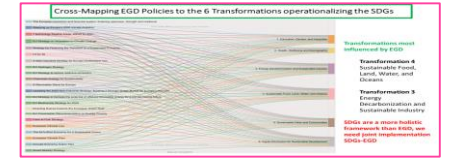
Just Transition: Policies, Finance, Labor Market



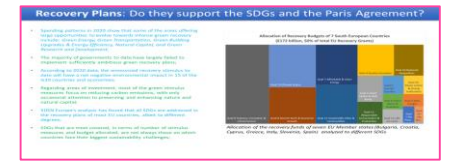
Machine Learning Textual Analysis
Does the EGD support the implementation of the SDGs?



Which of the 6 Sustainable Development Transformations are supported by the EGD?



Are the European Recovery and Resilient Plans
SDGs-compatible?



Does the European Semester Process facilitate the implementation of the SDGs?

Sustainable Finance: Valuing Natural and Cultural Capital

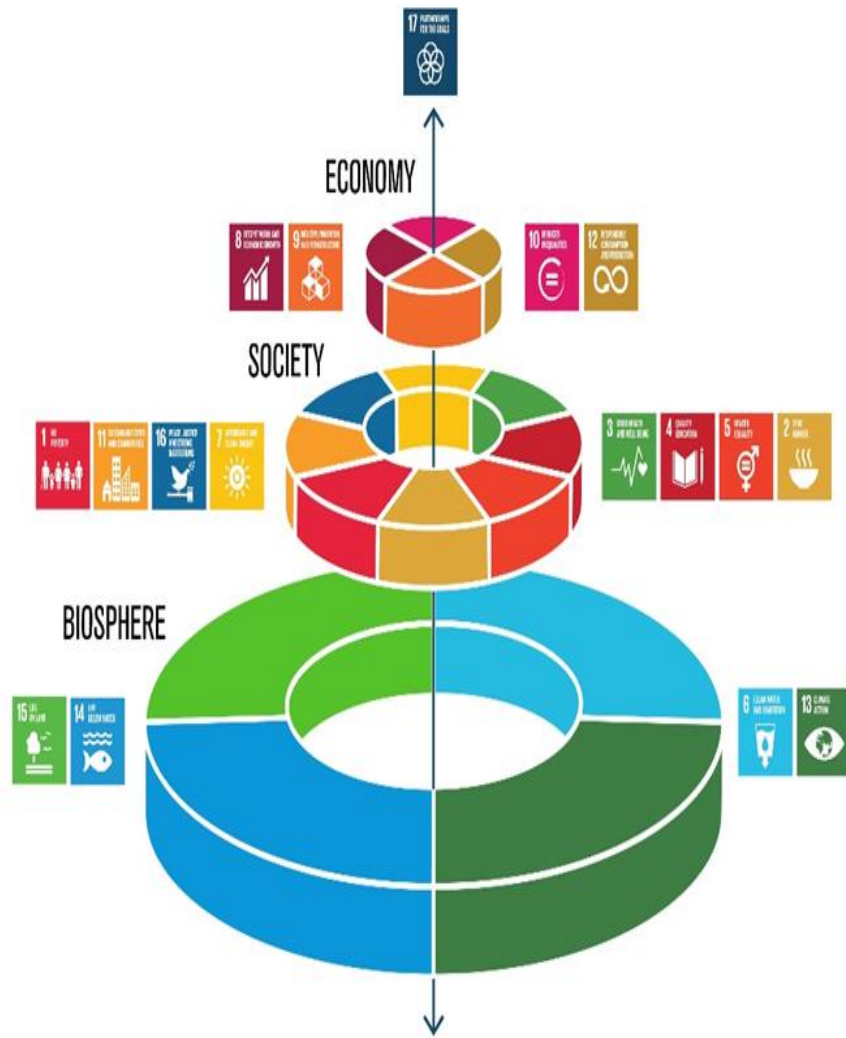
Fiscal Innovation: What are the distributional effects of Key EU climate policies?

Sustainable ESG-SDG Driven Transformation

Corporate ESG-SDG Footprint through Advanced Metrics

AE4RIA matrix

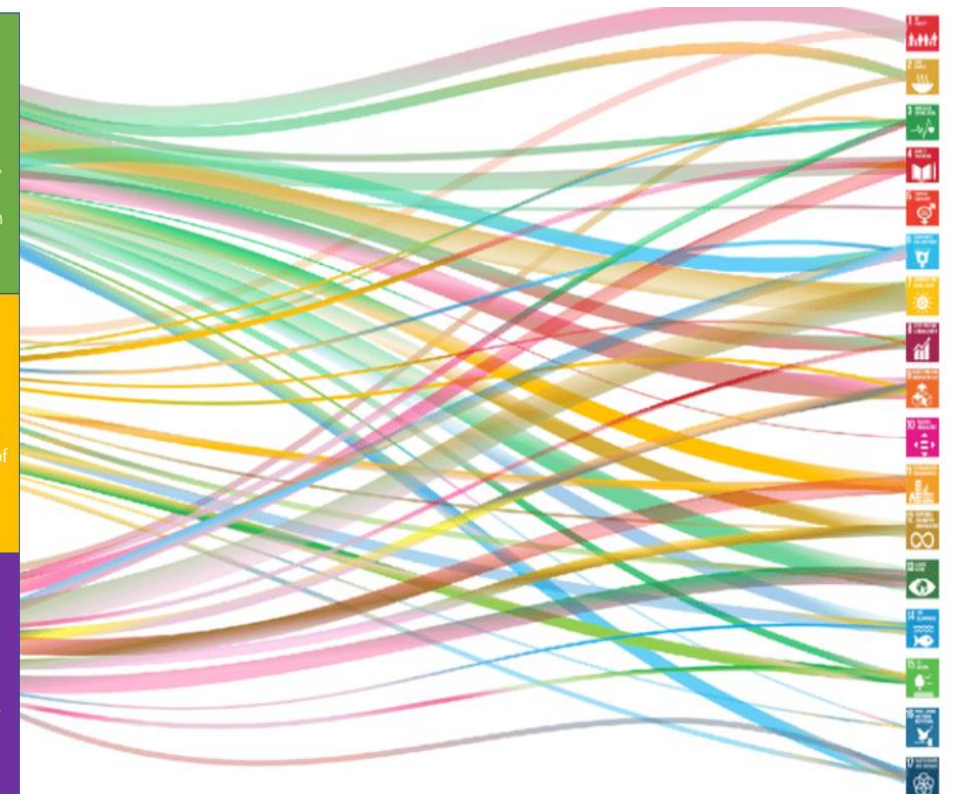
Integrate Corporate Sustainability Reporting into SDGs
Decision Making Tools and Models to Accelerate



Environment
Company's impact (at supply chain level) on the natural environment and its response to the challenge of climate change (greenhouse gas emissions, energy consumption, generation and use of renewable energy, biodiversity and habitat, impact on water resources and deforestation, pollution, efficient use of resources, the reduction and management of waste)

Social
Company's interaction with workers, other stakeholders and the communities in which it operates and the role of the Company in society including: workplace policies ethical/responsible sourcing and social aspects and labour standards of the supply chain, and engagement with and contribution to the broader community through social projects and charitable donations.

Governance:
The ethical conduct of the Company's business including its corporate governance framework, business ethics, policies, code of conduct and the transparency of non-financial reporting.



A Holistic Approach in line with CSRD for businesses to create value and move beyond compliance-based codes

1.Mapping

- Mapping the value Chain of Company - Products and Services
- Mapping the Stakeholders
- Materiality Assessment By Stakeholder

Measurement

- ESG KPIs in accordance with Sustainability Reporting Standards (2023, 2024)
- Map ESG [KPIs](#) across the Value Chain
- MAP ESG KPI's to SDGs Indicators
- Set Targets

3.Assessment & Monitoring

- ESG/SDG Dashboards – Level of Implementation of SDGs and trends to 2030/2050
- Monetization of externalities/ intangible assets
- Design Hybrid Metrics [to](#) Optimize for Value

Transformative Participatory Approaches: National Living Labs and Systems Innovation



Head



Team



Our transformative and participatory approaches seek to bridge the gap between science, policy and society, by supporting key actors to utilize model outputs to make sustainable decisions.

Methodologies

- Transformative Living Labs
- System Innovation and Transition Management
- Innovation Pathways
- Foresight methods such as Backcasting
- key actions and policy recommendations
- Living Lab Modeler Tool

Supporting Projects

Erasmus + | CATALYST: European VET Excellence Centre for Leading Sustainable Systems and Business Transformation

CATALYST: European VET Excellence Centre for Leading Sustainable Systems and Business Transformation

The CATALYST project 'European VET Excellence Centre for Leading Sustainable Systems and Business Transformation' is designed with strong vision and motivation to contribute to realisation of the European Green Deal and the new Industrial and SME Strategies.

The main goal is with the establishment of united CATALYST Centre of Vocational Excellence in 5 countries to give support, create an educational offer to tackle personal and organisational development, and to embrace transformation in SMEs, enabling and inspiring them to re-think and redesign their business models, co-creating and sharing between educational and business organisations.

Challenge owners:
Port, Ministry of Skills, Implementation period: 2023-2025
Find more at: <https://demo-stillborn.com/erasmus-catalyst>

System Mapping

It seeks to:

- activate communities in the recovery phase,
- set system mapping
- provide new indicators
- support local authorities in planning challenges

decarbonize the sea and shipping

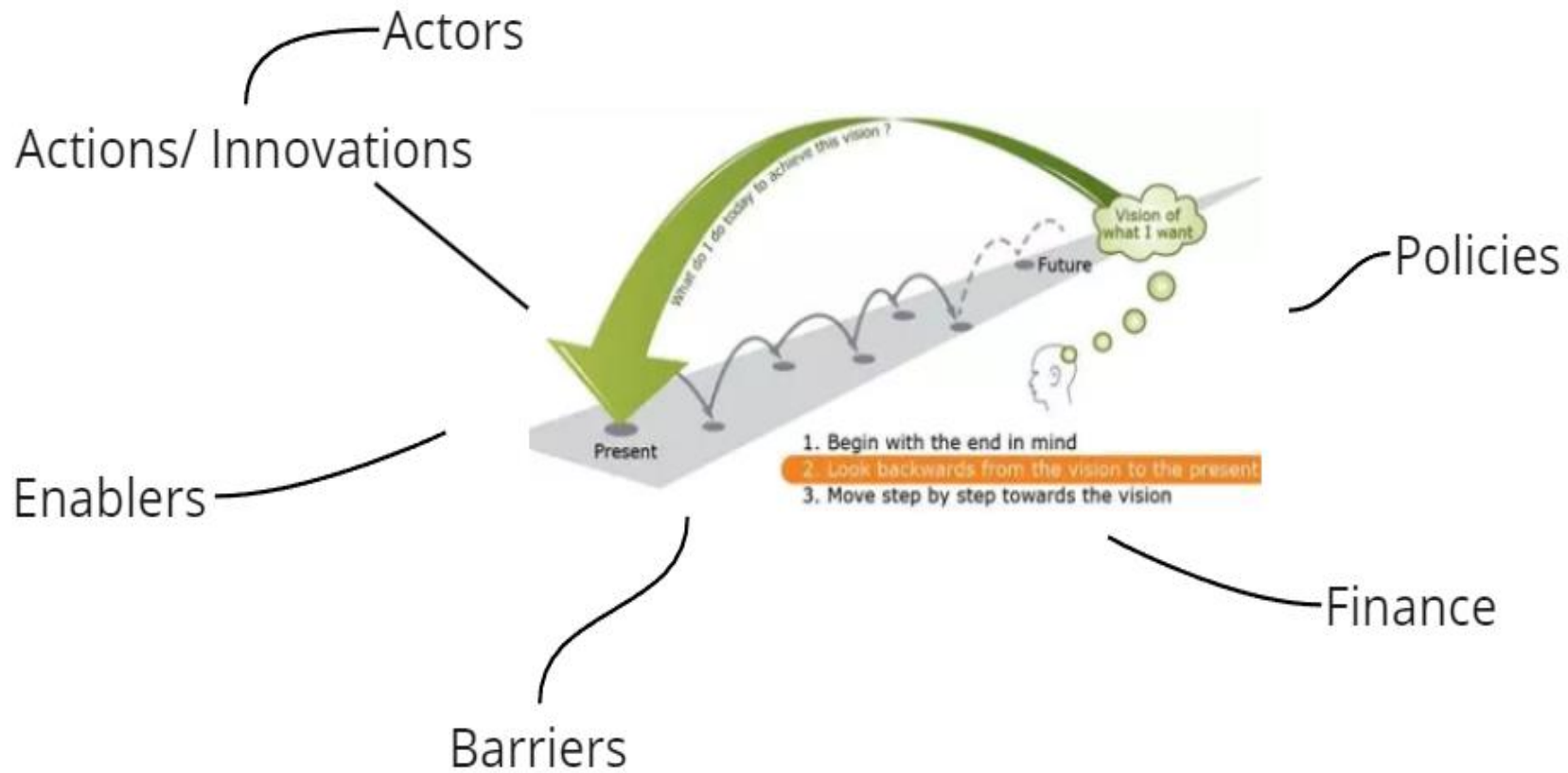
- identify catalytic dependencies
- breakthrough
- Create new

SUSTAINIS

Grant agreement ID: 101019750
Duration: 2023-2025
Budget: € 264,000
Coordinator: ...

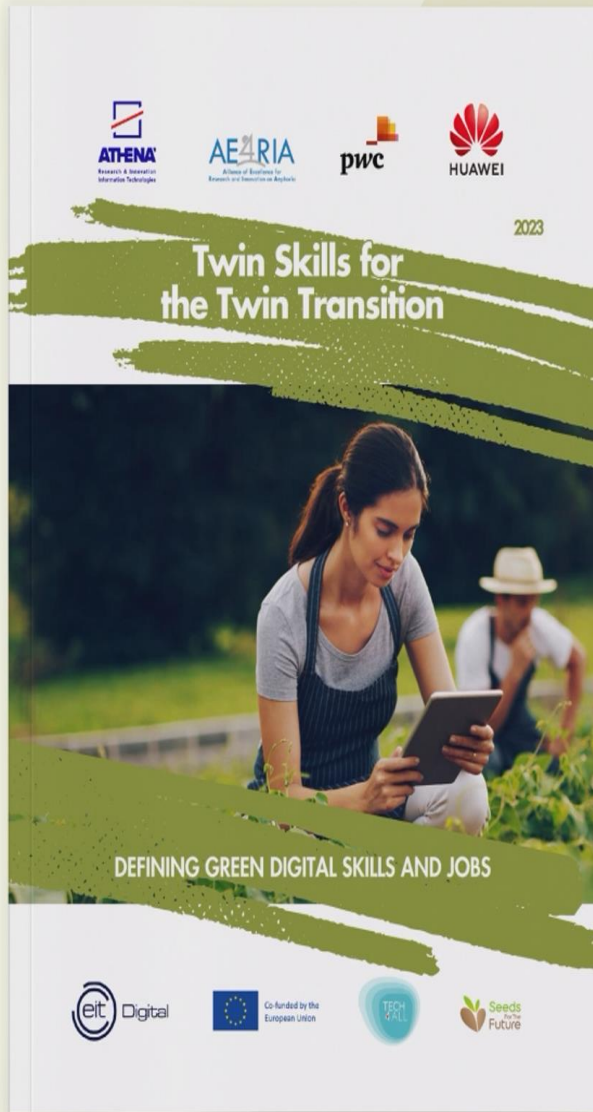
Countries: Bulgaria, Serbia
Implementation period: 2023-2025
Budget: € 264,000
Find more at: <https://www.sustainis.com>

Innovation Pathways



Technological, Social, Financial and Policy Innovations





**DOWNLOAD
THE REPORT**



*85% of Jobs that will exist in 2030
haven't been invented yet!*

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Chair World Council of Environmental Resource Economists Associations

Chair SDSN Global Climate Hub and SDSN Europe

03.12.2023



**COP28
UAE**

RESULTS: The New Set of Green Digital Skills



Table 1 Top Green Digital Skills and Occupations (Jobs)

EU Policy ¹⁰	Sector (NACE Rev. 2)	Green Digital Skills	Green Digital Occupations
Corporate Sustainability Reporting (ESG)	All sectors	advising on environmental issues	environmental education officer
EU Taxonomy Regulation		analysing and evaluating information and data	environmental expert
EU Sustainable Finance Disclosure Regulation (SFDR)		complying with environmental protection laws and standards	green ICT consultant
EU Sustainable Investment Plan		computer use	natural resources consultant
Corporate Sustainability Reporting Directive (CSRD)		database and network design and administration	nature conservation officer
EU Action Plan on Financing Sustainable Growth		environmental sciences	sustainability manager
Environmental and Energy Policies			
European Green Deal	Agriculture, Forestry and Fishing	analysing and evaluating information and data	electric meter technician
EU Biodiversity strategy for 2030	Construction	complying with environmental protection laws and standards	electrical transmission system operator
Circular Economy Action Plan	Energy Supply	computer use	electricity distribution technician
Waste Framework Directive	ICT	database and network design and administration	energy assessor
Air Quality Directive	Manufacturing	designing electrical or electronic systems or equipment	energy systems engineer
Water Framework Directive	Transport and Storage	disposing of non-hazardous waste or debris	environmental education officer
Renewable Energy Directive	Water and Wastewater Treatment	electricity and energy	geothermal technician
Energy Efficiency Directive		environmental protection technology	green ICT consultant
EU Emission Trading System (EU ETS)		handling and disposing of hazardous materials	hazardous waste inspector
Just Transition Fund		maintaining electrical, electronic and precision equipment	irrigation technician
Connecting Europe Facility (CEF)		monitoring environmental conditions	recycling specialist
Fit for 55		operating agricultural or forestry equipment	smart home engineer
		using precision measuring equipment	smart home installer
Industry Policies			
EU Industrial Policy	Construction	analysing and evaluating information and data	acoustical engineer
Green Deal Industrial Plan	Energy Supply	analysing scientific and medical data	botanist
EcoDesign	Health and Social Care	complying with environmental protection laws and standards	ecologist
Critical Raw Materials Act	ICT	computer use	energy assessor
Chips Act	Manufacturing	database and network design and administration	energy systems engineer
	Mining and Quarrying	designing electrical or electronic systems or equipment	environmental education officer
		electronics and automation	green ICT consultant
		maintaining electrical, electronic and precision equipment	smart home engineer
		using precision measuring equipment	smart home installer



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Recommendations for Universities and TVET



Financial Sector:

- ▷ Mainstream ESGs
- ▷ Enhance skills in ESG and SDG metrics

Energy:

- ▷ technical knowledge for application of energy-efficiency measures
- ▷ technical knowledge for application of renewable energy technologies
- ▷ • upgraded skills for emergent energy markets

Manufacturing:

- ▷ raw material collection
- ▷ pre-processing
- ▷ production
- ▷ distribution
- ▷ trade (marketing)
- ▷ sustainable business and product development

Agricultural and Food:

- ▷ advanced wastewater treatment practices
- ▷ improved packaging
- ▷ improved sensors and process control (to reduce waste and improve productivity)
- ▷ food irradiation
- ▷ water and wastewater reduction using closed loop/zero emission systems
- ▷ use of information and communication technology (ICT) in agriculture
- ▷ technical knowledge for new practices like organic farming and agroforestry

Recommendations for Universities and TVET



Green Skills:

- **Renewable Energy Expertise:** Proficiency in designing, installing, and maintaining renewable energy systems, such as solar panels, wind turbines, and hydropower systems.
- **Energy Efficiency:** Skills related to improving energy efficiency in buildings, industries, and transportation, including energy auditing and retrofitting.
- **Circular Economy Knowledge:** Understanding of circular economy principles, sustainable materials management, and waste reduction strategies.
- **Environmental Regulations:** Knowledge of EU environmental regulations and compliance requirements, including emissions standards and waste management.

Digital Skills:

- **Data Analytics:** Proficiency in data analysis and interpretation for optimizing energy consumption, predicting equipment failures, and enhancing energy efficiency.
- **Internet of Things (IoT):** Skills related to IoT device deployment and management for monitoring and controlling energy systems remotely.
- **Cybersecurity:** Understanding of cybersecurity measures to protect critical energy infrastructure and data.
- **AI and Machine Learning:** Knowledge of AI and machine learning algorithms for optimizing energy production, consumption, and grid management.



SUSTAINABLE DEVELOPMENT
SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS
Global Climate Hub



COP28
UAE

**UN SDSN Global Climate Hub Report:
Modelling Net Zero Pathways**

EU27, UK, Western Balkans, South East Asia

AE4RIA

<https://ae4ria.org/>

[UN SDSN GLOBAL CLIMATE HUB](https://unsdsn.globalclimatehub.org/)

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