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**SUSTAINABILITY AND RESILIENCE THROUGH
TRANSFORMATIVE INNOVATION POLICY, AT
NATIONAL AND REGIONAL LEVEL**

PHOEBE KOUNDOURI

SYLVIA SCHWAAG SERGER

ANGELOS PLATANIOTIS

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SUSTAINABILITY AND RESILIENCE THROUGH TRANSFORMATIVE INNOVATION POLICY, AT NATIONAL AND REGIONAL LEVEL

Prof. Phoebe Koundouri¹ , Prof. Sylvia Schwaag Serger² , Angelos Plataniotis³

¹ *Professor, School of Economics, Athens University of Economics and Business, Director ReSEES Research Laboratory, President, European Association of Environmental and Resource Economists, Fellow, World Academy of Art and Science, Chair AE4RIA, Alliance of Excellence for Research & Innovation on Aephoria, Director, Sustainable Development Unit, EIT Climate KIC Hub Greece at ATHENA Information Technology Research Center, Co-Chair, UN SDSN Europe and UN SDSN Greece.*
pkoundouri@aueb.gr

² *Lund University, Research Policy Institute, sylvia.schwaag_serger@ekh.lu.se*

³ *PhD candidate, National and Kapodistrian University of Athens, Department of Economics, aplataniotis@econ.uoa.gr*

Abstract

The European Green Deal (EGD), introduced in December 2019 by the European Commission as Europe's Growth Plan, aims to make Europe climate-neutral, resource-efficient, socially inclusive, and innovative. The UN Agenda 2030 for Sustainable Development with its 17 Sustainable Development Goals (SDGs), is a pledge to eradicate poverty and achieve sustainable development on a global scale by 2030, considering three pillars of sustainable development – economic, social, and environmental. The two frameworks share common objectives, one being the need for Innovation Policies to support transformations required to address current global challenges, like the Climate Crisis and the consequences of the COVID-19 pandemic. In this paper, we describe the interdependence between innovation policy and Agenda 2030's implementation, in line with Europe's vision for Industry 5.0, and we demonstrate how funding mechanisms like the Next Generation EU recovery package, can support countries in becoming more resilient through Green and Digital Transformations.

Introduction

The European Green Deal (EGD), introduced in December 2019 by the European Commission as Europe's Growth Plan, aims to make Europe climate-neutral, resource-efficient, socially inclusive, and innovative. The ambition of the EGD to make Europe the first carbon-neutral continent in the world by 2050, is a unique opportunity to modernize both the EU economy and society and reorient them towards a more equitable and sustainable future. Research and innovation are critical factors in showing the right directions for transformations and accelerating them through the deployment of solutions, and by ensuring the engagement of citizens in social innovation.

At the same time, the UN Agenda 2030 for Sustainable Development with its 17 Sustainable Development Goals (SDGs), is a pledge to eradicate poverty and achieve sustainable development on a global scale by 2030, considering three pillars of sustainable development – economic, social, and environmental. In the UN Agenda 2030 context, Innovation expresses the modern or improved social structure and practices, as well as novel or enhanced technological products and processes. Apart from a concept that is explicitly captured by SDG 9, which calls for building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation, Innovation is a catalyst for most, if not for all, of the other SDGs.

The two contexts, namely the EGD and the 17 SDGs, have common objectives, meaning that the implementation of EGD policies supports actions that contribute to the achievement of various SDGs and vice versa. Therefore, national development strategies based on smart specialization, driven by Research, Technology and Innovation are necessary to ensure the joint implementation of these Frameworks. Smart specialization is about identifying the unique characteristics and assets of each country and region, highlighting each region's competitive advantages, and mobilizing regional stakeholders and resources around an excellence-driven and outward-looking vision for the future.

In the aftermath of the COVID-19 pandemic, nations and societies need more than ever before not only to recover from this crisis but to become more resilient against future outbursts. But this becomes even more complex if we consider that in addition to health, there are two more global crises in progress. That of the economic downturn that accompanies the pandemic and that of the climate crisis that in recent decades is becoming increasingly apparent with its devastating consequences on the property, infrastructure, and even more dramatically on human lives.

In the following sections, we analyze the interdependence between innovation policy and Agenda 2030's implementation. We describe how various increasingly urgent societal challenges can be addressed through Innovation, which is a fundamental common element of the 17 SDGs and the European Green Deal. The joint implementation of these frameworks, supported by the National Recovery and Resilience Plans of Europe can help countries to obtain the Green and Digital Transformations that are required for more Sustainable and Resilient societies.

Innovation as a Driver of Sustainable Development

In 2015, 193 countries adopted the **Agenda 2030 for Sustainable Development**¹, an ambitious, universal, transformative and rights-based plan introduced by the General Assembly of the United Nations, for the elimination of extreme poverty, the reduction of inequalities, and the protection of the planet.

The 17 Sustainable Development Goals (SDGs) (Table 1), included in the Agenda, is a universal blueprint for the promotion of sustainable and inclusive economic growth, which helps nations to design transformative pathways for a sustainable and resilient future.

Goal	The ambition of the Goals
Goal 1- No Poverty	End poverty in all its forms everywhere
Goal 2- Zero Hunger	End hunger, achieve food security and improve nutrition and promote sustainable agriculture
Goal 3- Good Health & Well Being	Ensure healthy lives and promote well-being for all at all ages
Goal 4- Quality Education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5- Gender Equality	Achieve gender equality and empower all women and girls
Goal 6- Clean Water & Sanitation	Ensure availability and sustainable management of water and sanitation for all
Goal 7- Affordable & Clean Energy	Ensure access to affordable, reliable, sustainable, and modern energy for all
Goal 8- Decent Work & Economic Growth	Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all
Goal 9- Industry, Innovation & Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation
Goal 10- Reduced Inequalities	Reduce inequality within and among countries
Goal 11- Sustainable Cities & Communities	Make cities and human settlements inclusive, safe, resilient, and sustainable
Goal 12- Responsible Consumption & Production	Ensure sustainable consumption and production patterns
Goal 13- Climate Action	Take urgent action to combat climate change and its impacts
Goal 14- Life Below Water	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development
Goal 15- Life On Land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss
Goal 16- Peace Justice & Strong Institutions	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels
Goal 17- Partnerships for the Goals	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

TABLE 1 A BRIEF PRESENTATION OF THE 17 SUSTAINABLE DEVELOPMENT GOALS

Innovation is a crucial element of the required transformations, and some of the 17 SDGs are referring explicitly to it. For example:

- Indicator 8.2 (SDG 8): *Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors;*
- Indicator 8.3 (SDG 8): *Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and*

¹ United Nations, 2015, Transforming our world: the 2030 Agenda for Sustainable Development, <https://sdgs.un.org/2030agenda>

innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services;

- *Indicator 9.5 (SDG 9): Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending;*
- *Indicator 9. b (SDG 9): Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities.*

Six Transformation Pathways

The SDGs call for profound changes in every country, requiring coordinated efforts by governments, civil society, research, and business. [Sachs et al. 2019](#), suggest 6 major categories of Transformations (Figure 1) that take into account the SDGs' interdependencies and integrate them in public policy interventions: **(1) education, gender and inequality;** **(2) health, well-being and demography;** **(3) energy decarbonization and sustainable industry;** **(4) sustainable food, land, water and oceans;** **(5) sustainable cities and communities;** and **(6) digital revolution for sustainable development.**

The 6 Transformations promote a broader consensus on how the 17 SDGs can be achieved and facilitate their operationalization at a country level. Their implementation must be Systems-based, to efficiently support critical synergies and trade-offs between interventions. For example, when it comes to promoting system-wide decarbonization, Transformation 3 encompasses all main energy usage. Similarly, Transformation 4 integrates agriculture, food, and biodiversity, as the first two are primary causes of biodiversity loss.

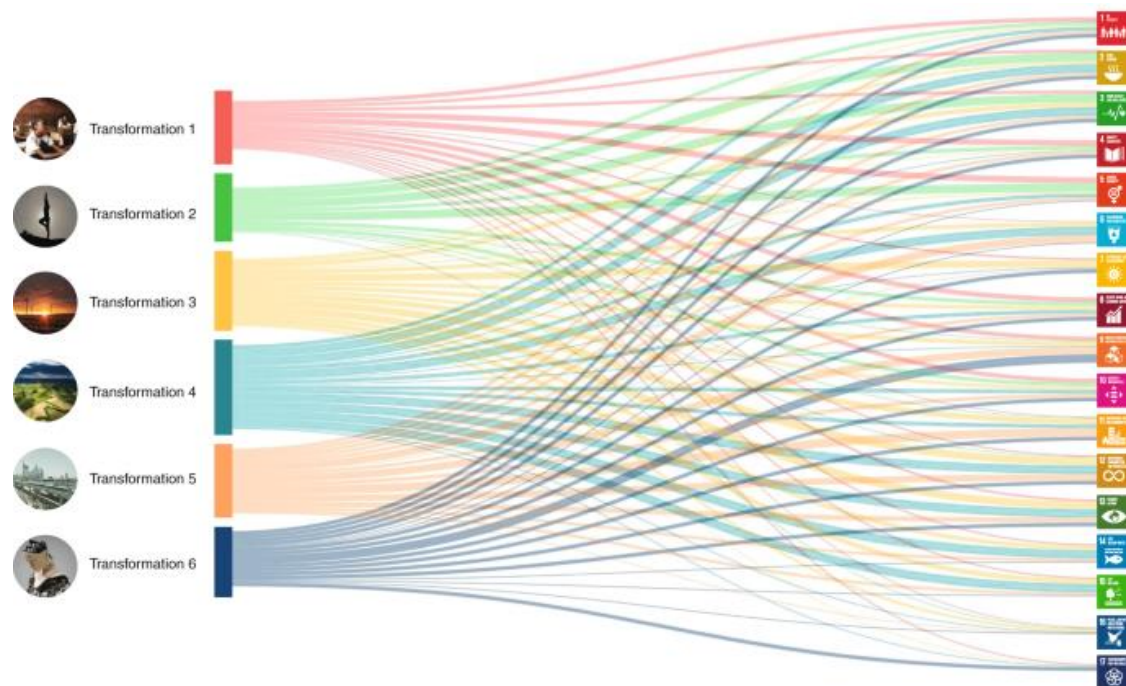


FIGURE 1 A SANKEY DIAGRAM ON HOW EACH SDG TRANSFORMATION CONTRIBUTES TOWARDS THE 17 SDGs.

European Green Deal and Innovation

The European Green Deal (EGD), introduced in December 2019 by the European Commission, is the new growth strategy for Europe, aiming to transform the EU into a fair and prosperous society, with a cutting-edge, resource-efficient, and competitive economy;

EGD is grounded on four horizontal priorities:

1. To make Europe a climate-neutral continent;
2. To protect human life, animals and plants by eliminating pollution;
3. To help European companies become world leaders in clean technologies;
4. To ensure that the green transition is just and inclusive;

The EGD and the 17 SDGs share common objectives, which means that the implementation of EGD policies supports the achievement of various SDGs and vice versa. [Sachs, J., Koundouri, P., et al. 2021](#) proposed a methodology that links the objectives of the nine EGD Policy Areas² with those of the 17 SDGs, by matching parts of the EGD document to conceptually related SDGs.

The results are very vibrant on the relationship between SDGs and the EGD policy areas (Figure 2). Dark green represents a straight connection between EGD and SDG, according to the number of the EGD text extracts that are conceptually similar to the SDG ambition. Light green coloured illustrate indirectly associations between EGD and SDGs, and white show a weak or no obvious linkage.

SDG 9 "Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation" which explicitly refers to Innovation, is linked to all nine EGD Policy areas. Therefore, Innovation is a critical element for the EGD, as it is for the SDGs, as well.

² The four priorities are planned to be achieved by implementing policies in the following nine areas: Biodiversity, from Farm-to-Fork, Sustainable Agriculture, Clean Energy, Sustainable Industry, Building and Renovating, Sustainable Mobility, Eliminating Pollution, Climate Action.

The Global Goals for Sustainable Development - Agenda 2030	The European Green Deal								
	P1 Biodiversity	P2 From Farm to Fork	P3 Sustainable agriculture	P4 Clean energy	P5 Sustainable industry	P6 Building and	P7 Sustainable mobility	P8 Eliminating pollution	P9 Climate action
Goal 1 - No Poverty									
Goal 2 - Zero Hunger									
Goal 3 - Good Health & Well Being									
Goal 4 - Quality Education									
Goal 5 - Gender Equality									
Goal 6 - Clean Water & Sanitation									
Goal 7 - Affordable & Clean Energy									
Goal 8 - Decent Work & Economic Growth									
Goal 9 - Industry, Innovation & Infrastructure									
Goal 10 - Reduced Inequalities									
Goal 11 - Sustainable Cities & Communities									
Goal 12 - Responsible Consumption & Production									
Goal 13 - Climate Action									
Goal 14 - Life Below Water									
Goal 15 - Life On Land									
Goal 16 - Peace Justice & Strong Institutions									
Goal 17 - Partnerships for the Goals									

FIGURE 2 MAPPING OF THE EUROPEAN GREEN DEAL POLICIES TO THE 17 SDGs. SOURCE: SACHS, J., KOUNDOURI, P., ET AL. 2021

Like in the case of the SDGs, the implementation of the EGD should be systems-based on an approach, to address several objectives at the same time and promote policy instruments and technical solutions that can be applied across industries. A “systems approach” implies that efforts for the achievement of one or more of EGD objectives must be coordinated and utilize one or more of the available policy instruments or technical solutions. A single action may negatively affect an objective, but a coordinated action could have a multiplier effect and accomplish more than one goal at the same time. The electricity grid, for example, is a complex system that must continue to be functional and efficient even during the most significant transformation in its history.

No policy or technology can support decarbonization by itself or that can be adopted without full consideration of its spillover consequences for the wider system (Sachs, J., Koundouri, P., et al. 2021).

Innovation in the European Green Deal Policies

According to the President of the European Commission, the process of the European Semester³ must be reoriented and become an instrument that integrates the SDGs, which constitute the most widely accepted framework for sustainable development globally ([von der Leyen, 2019, political guidelines](#)). This will help ensure that Europe’s pathway in achieving climate neutrality, within a comprehensive economic framework that gives equal opportunities to everyone.

During 2020 and 2021, the European Commission published several Policy documents and Strategies to support the implementation of the European Green Deal and the achievement of its ambitious goals. These documents affect all the sectors of the economy, the way the financial markets operate as well as the everyday life of European citizens.

[Sachs, J., Koundouri, P., et al. 2022 \(forthcoming\)](#), using a list of 22 significant policies and strategies published during the past two years proposed an approach to match them with the SDGs. The matching was made by identifying phrases or sentences in each document that are conceptually related to each one of the seventeen Goals. Using a 4-point scale they score the level of a Policy’s impact on the SDGs, assuming that the greater the number of relevant references, the greater the influence (Figure 3).

	SDG 1	SDG 2	SDG 3	SDG 4	SDG 5	SDG 6	SDG 7	SDG 8	SDG 9	SDG 10	SDG 11	SDG 12	SDG 13	SDG 14	SDG 15	SDG 16	SDG 17	Total Score
A New Industrial Strategy for Europe (COM/2020/102)	1	2	1	2	0	0	3	2	3	0	1	2	2	1	2	2	2	26
Circular Economy Action Plan	0	2	1	0	0	2	2	2	3	2	0	3	2	2	2	0	0	23
EU Biodiversity Strategy for 2030	0	2	2	1	1	0	2	2	1	1	0	2	2	3	3	0	2	24
Farm to Fork Strategy	2	3	2	0	0	0	2	2	1	2	0	3	2	2	2	0	1	24
EU Hydrogen Strategy	1	0	0	2	0	0	3	2	3	1	2	2	3	0	0	2	1	22
7 technology flagship Areas, ASGS for 2021	0	0	2	1	1	0	2	3	3	3	3	2	2	0	1	2	1	26
Stepping up Europe's 2030 climate Ambition	0	0	2	1	0	0	3	2	3	3	2	3	3	1	2	0	0	25
Chemicals strategy for Sustainability	0	1	3	0	0	0	1	0	3	0	1	2	3	3	3	1	0	21
EU Strategy to reduce methane emissions	1	3	1	1	0	0	2	1	2	0	1	2	1	1	1	1	1	19
A Renovation Wave for Europe	1	0	0	1	0	0	3	1	2	0	3	2	3	1	1	1	1	20
EU Commission Recommendation on Energy Poverty	3	0	0	0	0	0	2	2	0	3	1	1	2	0	0	0	0	14
EU Strategy to harness the potential of offshore renewable energy for a climate neutral future	0	0	0	1	0	0	3	2	3	0	2	1	3	2	0	2	2	21
European Climate Pact	0	2	1	2	1	0	0	1	2	1	2	2	3	2	2	0	0	21
Smart Mobility Strategy	0	1	2	0	0	0	3	0	3	2	2	2	3	2	0	0	1	21
The European economic and financial system: fostering openness, strength and resilience	0	0	1	0	0	0	2	2	2	1	0	1	1	0	1	3	3	17
EU Strategy on Adaptation to Climate Change	2	2	2	1	1	3	2	3	3	2	3	1	3	2	2	2	2	36
Directing finance towards the European Green Deal	0	0	0	0	0	0	2	0	2	0	2	0	2	3	1	1	0	11
Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery	1	2	1	2	0	0	3	2	3	0	1	2	2	1	2	2	2	26
The EU's Blue Economy for a Sustainable Future	0	2	0	1	1	2	2	1	1	0	2	2	2	3	0	0	1	20
European Climate Law	0	2	2	0	0	2	2	2	2	2	0	2	3	2	2	0	2	25
Strategy for Financing the Transition to a Sustainable Economy	0	0	0	0	0	1	1	3	3	3	1	1	2	1	2	3	2	23
Fit for 55	0	0	1	1	0	1	3	2	3	3	3	3	3	0	2	0	2	27
Total Score	12	24	24	17	5	11	46	39	49	31	30	43	53	30	31	21	26	

FIGURE 3 THE CONNECTION OF 22 EUROPEAN POLICIES AND STRATEGIES TO THE 17 SDGS

The close relationship between the two frameworks, namely the European Green Deal and the Agenda 2030, is also validated by two Machine Learning models, an Information Retrieval (IR) model and a Deep Learning one, for the assessment of the connection between Policy documents and the SDGs [Sachs, J., Koundouri, P., et al. 2022 \(forthcoming\)](#).

It is worth to be noted that “SDG 9 - Industry, innovation and infrastructure: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation”

³ The European Semester serves as a framework for the integrated monitoring and coordination of economic and employment policies across the European Union. Since its inception in 2011, it has become a well-established forum for discussing the fiscal, economic, and employment policy challenges confronting EU countries on a yearly basis.

seems to be one of the most significant SDGs in the European Policy Framework. The urgency of taking early and dramatic measures to combat climate change and to achieve climate neutrality in Europe by 2050 was particularly emphasized in the European Green Deal Communication. The close link to SDG 9 was therefore expected, as the policies stemming from the European Green Deal contain requirements on the exploitation of research results and innovation in the industry and infrastructure, aiming to increase the resilience of countries and communities to the effects of ever-worsening climate change. Characteristic of this intention is that to mobilize the European research and innovation community and contribute to this fundamental goal of the Green Deal, the Commission established Horizon Europe, a EUR 95.5 billion funding programme for research and innovation, which among other things, it fosters industrial competitiveness by assisting in the creation and dissemination of superior knowledge and technologies.⁴

⁴ European Commission, Horizon Europe, https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

Transformative Innovation Policy and Agenda 2030

Traditionally, Innovation was treated with a “good-to-have” approach, as it was considered to leverage a Country’s economic growth and competitiveness. However, Governments must shift from this “reactive” approach to a more strategic one and policymakers must on specific challenges like climate change, ageing populations, urban development, resilience against pandemic outbreaks (Lundin N., Schwaag Serger S., 2018).

It's not always easy to switch from a traditional project-based approach to a system-innovation approach due to a lack of broad and organized policy context. A structural and strategic transition of this magnitude requires a policy framework like Agenda 2030. But, the 17 SDGs propose a new holistic and integrated vision for socially, economically, and environmentally sustainable development, asking national governments to reassess and redefine current policy objectives, strategies, and practices.

For Agenda 2030 to be fully implemented, the development of policies at the conceptual level is certainly not enough. Instead structural and organizational changes are necessary. These changes must be grounded on a thorough understanding of both the research and policy boundaries of sustainability and the role of innovation and the role of innovation policy in achieving sustainability.

The adoption of Agenda 2030 goals in a country does not necessarily mean that it has to start from the beginning. Instead, it should be integrated into the existing national development strategy and take advantage of existing procedures and infrastructure. At the same time, however, to be effective, it must identify the points where the 17 SDGs can add value and make the appropriate adjustments.

To achieve Agenda 2030, a system approach implies greater coordination and cooperation between innovation policy and other policy domains. The emphasis on the "directionality" of innovation policy highlights the strategic importance as well as the transformative potential of merging "topdown" governmental initiatives with bottom-up innovation practices and activities. To make such a combination meaningful and effective, however, considerable knowledge and capacity challenges in many policy disciplines, including innovation policy, must be addressed.

A Transformative Vision for Europe

The lesson learnt from the tremendous COVID-19 pandemic is that the world needs to become more adaptable to future shocks and strains. As a result, Europe's objective must now be to increase resilience within our existing economic system and adapt to a new set of economic ecosystems that are more resilient to future shocks and pressures.

Until now, the transformation efforts of Europe were closely linked to the so-called 4th Industrial Revolution, which began a few decades ago, focusing mainly on digital systems interconnection, the development of cyber access infrastructure, and artificial intelligence applications. As currently conceptualized, the Industry 4.0 paradigm is unfit for purpose in the face of climate change and environmental disaster and does not alleviate underlying societal conflicts. It is structurally aligned with the optimization of business models and economic thinking that is causing the current threats, therefore a new vision for the future is required. In terms of Business models, Industry 4.0 objective is to minimize costs and maximize profits for shareholders in the context of current economic systems and capital markets landscape. Further, the need for a systemic change to decouple production from resource and material use has not been seen as a priority so far, leading to harmful environmental, climate, or social impacts.

As a response to the various Social, Economic and Environmental challenges, [European Commission, 2022](#) proposes Industry 5.0. Unlike Industry 4.0's unsustainable production model which was extraction-oriented, this new paradigm is more human-centric and well-being-driven. It adopts novel ways of economic production with circular characteristics and encourages industry to realize its full potential as one of the pillars of change by ensuring a framework that is both competitive and sustainable. It stresses the importance of sustainable and resilient alternatives for governance by exploiting technology and endorses a human-centric approach to technology by empowering workers through the utilization of digital tools. In Industry 5.0 the scope of corporate accountability is broadened to include the entire value chain of the company and indicators for each industrial ecosystem are introduced to illustrate progress toward well-being, resilience, and overall sustainability for each industrial ecosystem.

Transformations through National Recovery and Resilience Plans (NRRPs)

As a response to the enormous health, environmental and economic consequences of the COVID-19 pandemic, EU leaders have introduced "NextGeneration (NGEU)", a powerful package of policies and funds to aid economic recovery while pursuing Europe's Green and Digital transformation ([European Commission, May 2020](#)). NGEU comes with a stimulus of €750 billion agreed among the EU member states, on top of the EU long-term budget of €1.074 trillion for the 2021-2027 multiannual financial framework. This sums to €1.8 trillion, an unprecedented amount to support member states recover from the negative consequences of the COVID-19 crisis and the EU's long-term priorities across different policy areas. The NGEU is an effort to help and speed up the process of transitioning to a new reality, that will make the European Union more robust than before. It encourages activity reorientation toward innovation for resilience and imposes conditions on available financing and it demands member states to prioritize investments in the environment, technology, and healthcare.

The Recovery and Resilience Facility⁵ (RRF), the cornerstone of this NGEU accounting for 90% (or €672.5 billion) of the budget of the NGEU in loans and grants to assist reforms and investments, requires Member States to submit Recovery and Resilience Plans (RRPs), consistent with the EU priorities, namely: 1. Enhancement of economic and social resilience through increasing growth potential, job creation, and economic and social resilience; 2. Addressing the issues derived from the European Semester's country-specific recommendations; 3. Promotion of a green transition by allocating at least 37% of resources to climate action and environmental sustainability; 4. Promotion of digital revolution by devoting at least 20% of resources to the EU's digital transformation ([European Commission, Feb 2021](#)).

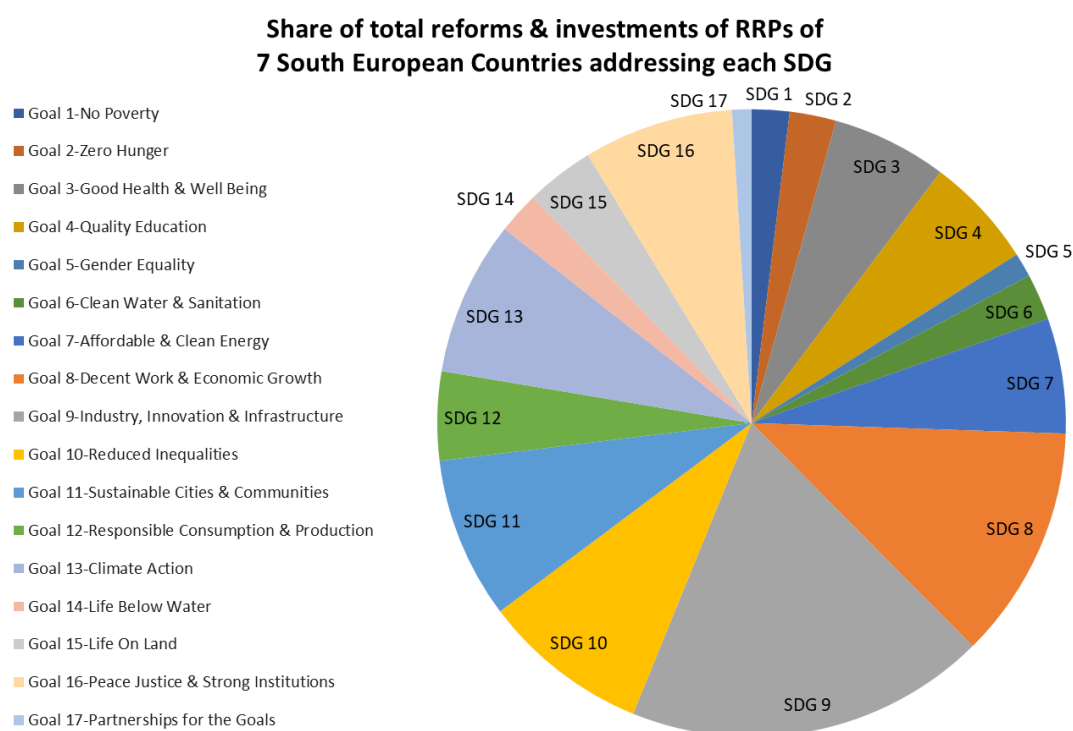
The main part of the EU's legally adopted recovery package provides funds to the Member States according to specific National Recovery and Resilience Plans (NRRPs). These Plans contain investments and reforms that were submitted by national governments to the European Commission in April and May 2021. Among other legal obligations, countries must align these plans with policy recommendations made by the Commission through the European Semester process and must contain a minimum amount of funds devoted to climate policies and digitalisation (at least 37% and 20% of the NRRP budget, respectively). However, EU countries were not obliged to align their NRRPs with SDGs. This lack of explicit linkage makes it difficult to assess whether the recovery packages indeed address all major environmental, social and economic sustainability challenges in each country, beyond the minimum requirements for climate- and digitalisation-related spending.

In SDSN's Report for 2022 ([Sachs, J., Koundouri, P., et al., 2022 \(forthcoming\)](#)) on the Joint Implementation of the European Green Deal and the 17 SDGs, an assessment of the NRRPs sustainability of seven South European Member States (Bulgaria, Croatia, Cyprus, Greece, Italy, Slovenia and Spain) is presented. These plans were submitted to the European Commission in spring 2021 and adopted by EU leaders in summer 2021. Collectively, they are

⁵ As the central instrument at the core of NextGenerationEU, the Recovery and Resilience Facility is responsible for assisting the EU in emerging stronger and more robust from the current crisis.

planning to attract more than 50% of the €338 billion grants made available by the EU’s Recovery and Resilience Facility, and an equally substantial portion of the €386 billion to be provided through loans. The number of measures and grants depends on the size of each country but also on the structure of each NRRP. For example, Croatia and Slovenia grouped their interventions (investments and reforms) in a small number of total measures (16 and 22 measures respectively), whereas Spain has presented a total of 396 measures. The amount of NRRP grants range between €1 billion (for Cyprus) and €69 billion (for each one of Italy and Spain).

The question mainly addressed in the report is how much each country’s NRRP contributes to SDGs and which SDGs are insufficiently addressed by the Plan. Although the several EU Member States have provided an SDG-related appraisal of their NRRPs, the assessment shown here goes beyond official reports by comparing this assessment with the country’s score in SDSN’s Europe Sustainable Development Report 2021 (ESDR), thereby underlining the gaps in policy design that need to be remedied by national authorities. It must be noted that the analysis for Italy and Spain has been adopted from ESDR 2021 (Lafortune G, et al. 2021) and the analysis for Cyprus comes from a broader assessment conducted for the country (Zachariadis, 2021).



GRAPH 1 RELEVANCE OF THE RECOVERY INVESTMENTS AND REFORMS OF SEVEN EU MEMBER STATES FOR EACH SDG.

Overall, it was found that all SDGs are addressed in the recovery plans, albeit to different degrees. SDGs that are mostly covered, in terms of several stimulus measures and budget allocated, are not always those on which countries face their biggest sustainability challenges.

(Sachs, J., Koundouri, P., et al. 2021) through a 3D-mapping between the European Commission’s Country Specific Recommendations (CSRs) the SDGs and the European Green

Deal, suggest that several major or significant challenges according to the SDSN’s Sustainable Development Report 2020 are not captured by CSRs, although the EU has largely achieved mainstreaming SDGs in its strategic priorities.⁶

Although several European nations demonstrate relatively poor performance on issues related to transforming food systems and diets and to biodiversity goals, these challenges have received lower attention in NRRPs than those related to other SDGs like green energy, electrification of transport, and energy efficiency measures. Although this misalignment is partly understandable because the ‘Next Generation EU’ package must be executed until 2026 and should therefore include ‘shovel-ready’ projects, the little focus on systemic issues such as the agri-food sector and biodiversity calls for increased attention of EU nations to these topics through other post-pandemic public and private investments.

It is possible to expand the analysis by highlighting those measures of NRRPs which contribute to several SDGs. These can be regarded as ‘lighthouse’ interventions, i.e. those measures yielding the greater sustainability impact. Although an exhaustive list is not provided here, the analysis has shown that some of the ‘best’ interventions in this regard are those which contribute to several sustainability objectives at the same time, e.g. modernising the economy, enabling the low-carbon and low-pollution transition and promoting social inclusion. At the level of individual measures, examples of such ‘lighthouse’ interventions are:

- Research and innovation funding on green transition
- Strengthening digital, green, blue and entrepreneurship skills of the unemployed or people over 55 and with special emphasis on unemployed women
- Upskilling the existing farmers’ community
- Valorisation of livestock waste and construction of biogas production units
- Promoting renewables and individual energy efficiency measures and tackling energy poverty in households with disabled people.

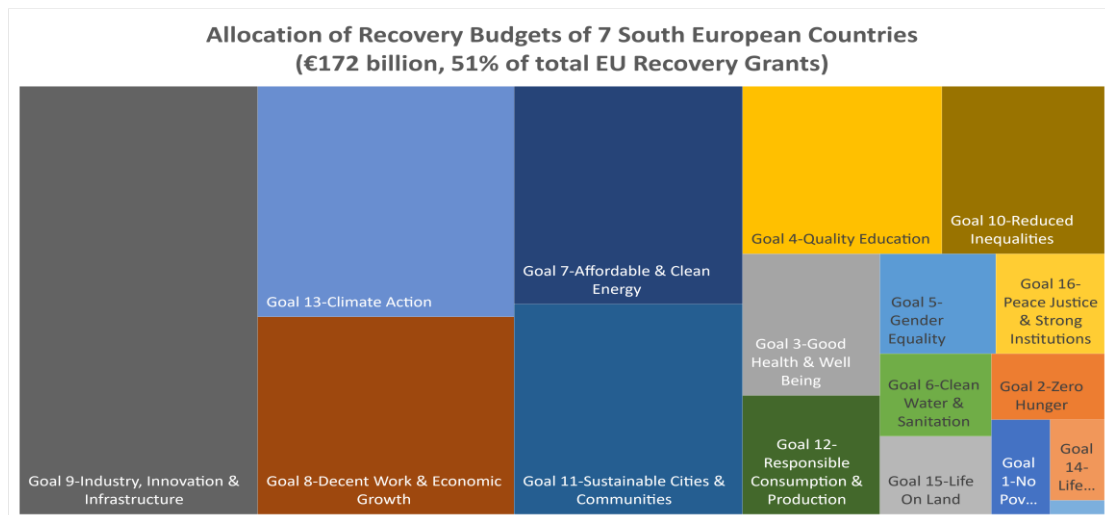


FIGURE 4 ALLOCATION OF THE RECOVERY FUNDS OF THE SEVEN EU MEMBER STATES ANALYZED TO DIFFERENT SDGs.

⁶ Country-specific results are provided in online Annex I of this report. Available here: [https://irp-cdn.multiscreensite.com/be6d1d56/files/uploaded/ANNEX%20I Member%20States%203D%20Mapping%20detailed%20results final.pdf](https://irp-cdn.multiscreensite.com/be6d1d56/files/uploaded/ANNEX%20I%20Member%20States%203D%20Mapping%20detailed%20results%20final.pdf)

Conclusions

The Agenda 2030, with its 17 Sustainable Development Goals (SDGs), as well as the European Green Deal, serve as the roadmap for structural reforms at the regional and national levels. As previously said, these frameworks are interconnected, and they have many common features, one of which is that they place a strong emphasis on innovation.

Countries must adopt a holistic approach to establishing transformation pathways, which will be dependent on the selection of the ideal combination of technology, financial instruments, and regulations.

Recovery from the COVID-19 pandemic in European countries will be greatly assisted by the "Next Generation EU" which will provide them with a tremendous opportunity to undergo the profound adjustments necessary to become models of sustainability and resilience in the world.

To the degree that an acceptable evaluation of an economic stimulus package has been conducted, as illustrated in [Zachariadis, T. \(2021\)](#), this approach should then be extended and implemented in all medium-term public finance programs. In the EU, NRRPs will be the main source of funding for investments and reforms in Eu Countries up to 2026, but not the only one; thus, the evaluation can be passed and applied to all funds included in the regular EU budget, i.e. the so-called European Structural and Investment Funds.

In 2020-2021, initiatives at OECD and EU levels put a strong focus on 'Green Budgeting' ([OECD, 2020](#)), which tracks the greenness of public budgets for one or more environmental objectives. This is an important starting point towards full consideration of SDGs in governmental actions, and national administrations that can go beyond Green Budgeting to 'SDG Budgeting' can offer a valuable service to the welfare of their societies. As suggested by [Lafortune et al. \(2020\)](#) and briefly shown in [Sachs, J., Koundouri, P., et al., 2022 \(forthcoming\)](#), it is possible to quickly identify gaps in the sustainability orientation of public policies by combining 'outcome-based' approaches such as SDG scores with forward-looking assessments of budgets that link all budget measures with SDGs and the Six Transformations.

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