



New **E**nabling **V**isions and Tools for **E**nd-use**R**s and stakeholders thanks to a common **M**odeling app**R**oach towards a **C**limat**E** neutral and resilient society

D5.2 NEVERMORE KPI Panel

May 2023



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101056858.

Document history

Project Acronym	NEVERMORE
Project ID	101056858
Project title	New Enabling Visions and Tools for End-useRs and stakeholders thanks to a common MOdeling appRoach towards a ClimatE neutral and resilient society
Project coordination	Fondazione Bruno Kessler (Italy)
Project duration	1st June 2022 – 31st May 2026
Deliverable Title	D5.2 NEVERMORE KPI Panel
Type of Deliverable	OTHER
Dissemination level	PU
Status	Final
Version	1.0
Work package	WP5 - Climate change mitigation and adaptation policies
Lead beneficiary	RINA-C
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Due date of delivery	31/05/2023
Actual submission date	30/05/2023

Date	Version	Contributors	Comments
12/05/2023	0.1	Sara ABD ALLA (RINA-C), Shanshan ZHU (RINA-C)	First final draft, including inputs from all partners involved in T5.2.
19/05/2023	0.2	Tage Vowles (IVL) and Chiara De Notaris (CMCC)	Review of draft
23/05/2023	0.3	Dietmar Lampert (ZSI)	Review of draft
25/05/2023	0.4	Sara ABD ALLA (RINA-C), Shanshan ZHU (RINA-C)	Final draft for project coordinator and technical manager quality control
30/05/2023	1.0	Alessia Torre (FBK), Ivan Ramos (CARTIF)	Final editing and submission



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Abbreviations and acronyms

Acronym	Description
EEA	European Environment Agency
EKNorr	Energikontor Norr AB (North Sweden Energy Agency)
KPI	Key Performance Indicator
SD	Sustainable Development

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Executive summary

Deliverable **D5.2 “NEVERMORE KPI Panel”** presents the outcomes of **T5.2 “Common KPI-driven evaluation panel of policies and measures”**. Task 5.2 was led by RINA-C with the active participation of FBK, CARTIF, NCSR, SIMAVI, CMCC, IVL, UVa, INFO, PAT, SITIA, TULCEA and EKNorr.

Deliverable 5.2 contains the set of Key Performance Indicators (KPIs) that are deemed to be relevant for the NEVERMORE evaluation framework and it is submitted as an Excel tool (deliverable type: OTHER) attached at the bottom of this document. The present Explanatory Note is elaborated to describe the methodological approach adopted for the KPI Panel definition.

The aim of Task 5.2 was to develop a KPI-driven evaluation panel for the evaluation and comparison of the policies and measures. The KPIs are co-designed and supported by research insights, feedback and comments (including policy objectives) received by stakeholders (consultations organised as part of T2.4 “Coordination of the participatory processes with stakeholders and end-users”) and the available data for the validation approach.

The KPI panel covers the three pillars of sustainable development (Environmental, Social and Economic). In addition, the EEA Policy Evaluation Framework was applied to include multi-impact indicators for both disaster scenarios and adaptation and mitigation measures.

1 Introduction

The **D5.2 “NEVERMORE KPI Panel”** covers the three pillars of sustainable development (environmental, social and economic) and presents multi-impact indicators to assess the effect of measures in terms of efficiency and effectiveness, in line with the European Environment Agency (EEA) framework (see Section 3). The Excel-based tool consists of 4 sheets:

- **Introduction:** presents the NEVERMORE affiliation and partners participating in the KPI Panel elaboration.
- **Environmental Pillar:** outlines 96 KPIs focusing on the environmental and sustainable development pillar.
- **Social Pillar:** outlines 100 KPIs focusing on the social sustainable development pillar.
- **Economic Pillar:** outlines 67 KPIs focusing on the economic sustainable development pillar.

The three KPI sheets (Environmental Pillar, Social Pillar and Economic Pillar) consist of the following columns:

- **Category:** the KPIs are subdivided into several categories in order to facilitate the area of analysis (Table 1).

Table 1. Categories

Environmental	Social	Economic
- Carbon Emissions	- Behavioural Change	- Economic Growth
- Climate Hazards	- Community Services & Inclusion	- Environmental taxes and transfers
- Energy	- Employment	- Inflation
- Food	- Health & Safety	- International financial flows: Official Development Assistance
- Land use	- Political System	- Technology and innovation: Patents
- Pollution		- Technology and innovation: R&D
- Resources consumption		- Tourism

- **KPI Name:** name of the KPI.
- **Level of application:** efficiency and effectiveness multi-impact indicators are analysed.
- **KPI Definition:** definition of the KPI.
- **Unit:** unit of measure of the KPI or formula/tools to measure the KPI.
- **Scale:** EU, National or local scale of application.
- **Source (if any):** eventual source considered.
- **Note:** relevant comments.
- **Sectoral affiliation:** affiliation according to the sectors identified in WP6 “Analysis of climate change impacts and risk at case studies”:
 - *Agriculture, forestry and fishing*
 - *Mining and quarrying*
 - *Energy Industry and commerce*
 - *Transport*
 - *Water and waste*
 - *Tourism/leisure/cultural heritage*
 - *Finance/Economy*
 - *Society*
 - *Biodiversity and natural heritage.*

2 Methodology

Task 5.2 was led by RINA-C with an active involvement of all NEVERMORE project partners. Its approach consisted of the following steps:

1. Identification of the policy evaluation framework to be followed in the evaluation of policies and for the selection of relevant KPIs (see Section 3 for details);
2. Collection of KPIs classified according to the following criteria:
 - Environmental, Social and Economic pillars.
 - Relevant category (e.g. energy, land use, economic growth, health & safety).
 - Level of application (effectiveness or efficiency).
 - Scale (EU, national and/or local).
 - Relevant sector, in alignment with WP4¹ and WP6² (i.e. agriculture, forestry and fishing; biodiversity and natural heritage; energy; transport; tourism, leisure/cultural heritage; technology, information and communication; cities, urban planning and construction; finance/economy; industry and commerce; society; mining and quarrying).

All partners contributed and collaborated on this task, led by RINA-C, each being in charge of collecting KPIs for one of the above-mentioned pillars;

3. Integration of comments, feedback and suggestions received by partners and collected in the context of the case study consultations (see Section 0 for details).

¹ NEVERMORE Work Package 4: Design, modelling & integration of economic, environmental & social damages functions

² NEVERMORE Work Package 6: Analysis of climate change impacts and risk at case studies

3 Policy Evaluation Framework

Environmental and climate policy objectives are frequently stated in terms of the anticipated impact of a policy on the situation it is intended to influence. When assessing policies, it is essential to understand the goals, objectives, and targets linked to public interventions, to select the right indicators.

The EEA's Policy Evaluation Framework addresses some of the difficulties that evaluators face in the context of environmental and climate policy. The EEA's suggested methodology seeks to foster a discourse on policy assessment addressing the different stages of the policy intervention. The EEA approach is presented in Figure 1.

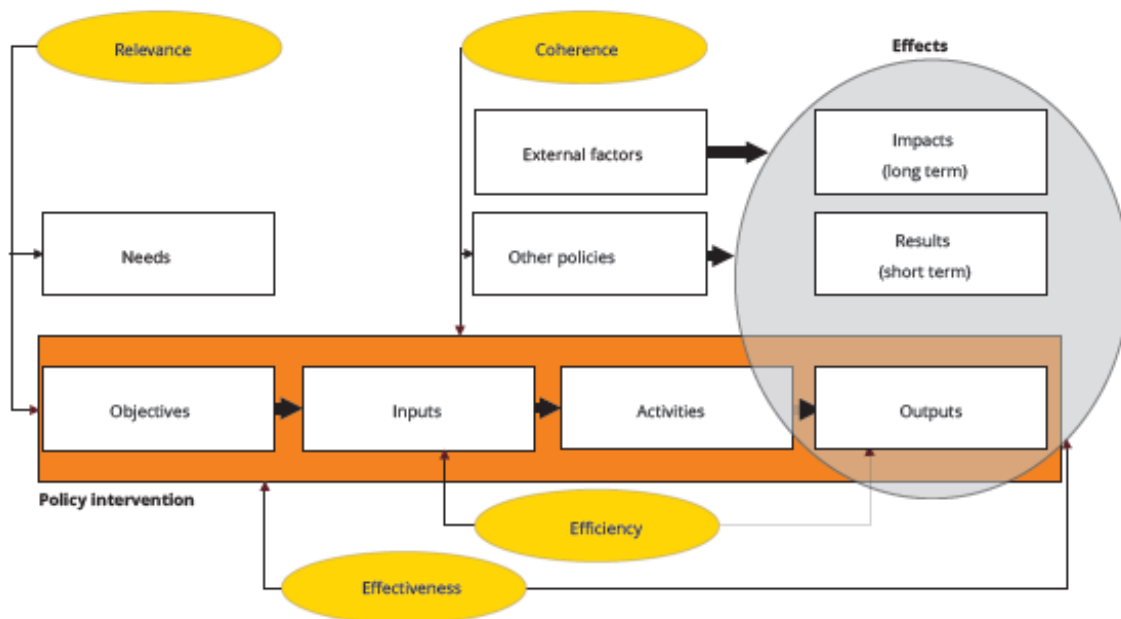


Figure 1. Policy Evaluation Framework (Source: EEA³)

In light of the NEVERMORE project structure and modelling exercise, the partners involved in Task 5.2 agreed to focus on the Effectiveness and the Efficiency Indexes.

The **Effectiveness Index** investigates to what extent a policy intervention caused observed effects and changes and to what extent do the observed effects correspond to the objectives.

The **Efficiency Index** focuses on the resources used to reach the observed output, as it investigates if the costs involved were justified, given the changes and effects achieved.

Effectiveness — To what extent did a policy intervention cause observed effects and changes? To what extent do the observed effects correspond to the objectives?

Efficiency — Were the costs involved justified, given the changes and effects achieved?

³ EEA Environment and Climate Policy Evaluation Framework <https://www.eea.europa.eu/publications/environment-and-climate-policy-evaluation/download>

4 Case Study Consultations

A strong engagement of local stakeholders is key for reaching the objectives of NEVERMORE.

NEVERMORE includes five case studies, that represent different socio-ecological EU contexts challenged by different climate change impacts: CS1 - Island (Sitia, Crete Island - Greece), CS2 - Mountain region (Trentino region – Italy), CS3 - Boreal region (Norrbotten County - Sweden), CS4 - Mediterranean region (Murcia region - Spain) and CS5 - Wetland (Danube Delta - Romania). As part of the co-design approach and as suggested in T2.4, RINA-C held five consultation sessions with the NEVERMORE case study leaders: Instituto de Fomento de la Region de Murcia (INFO), Provincia Autonoma di Trento (PAT), Dimos Sitias (SITIA), Institutia Prefectului Judetului Tulcea (TULCEA), Energikontor Norr AB (EKNorr) – and with the support of case study technical supporters CARTIF, FBK, NCSR, SIMAVI and IVL.

In particular, the objectives of the consultation sessions conducted by RINA-C were the following:

- Collecting feedback on the KPI panel framework structure;
- Collecting feedback on the preliminary set of KPI panel;
- Assessing the priority areas for each case study; and
- Identifying new KPIs to integrate into the panel (eventually).

All case study leaders agreed on the KPIs framework structure and on the important role played both by efficiency and effectiveness KPIs in order to evaluate climate policies. In particular, most of them suggested that, in the context of selection of climate policy measures to be implemented, effectiveness should be first assessed, followed by the identification of the best solution in terms of efficiency. As to the number of KPIs included in the Panel, case study leaders agreed on keeping the list as complete as possible. The intention is for it to be used as a supporting (non-exhaustive) list, which can later be adapted to the specific case study needs for the evaluation of policy measures in the following steps of the NEVERMORE project.

4.1 Case Study 1: Sitia

The Municipality of Sitia covers the Eastern part of the island of Crete and it is Europe's most "extreme climate hotspot" municipality, mainly due to thermal drought conditions. The economy is traditionally based on agricultural crops and olive trees, producing multiple Protected Destination of Origin (PDO) products, which has produced a steady increase in exports. Tourism has seen a rapid expansion in recent years. Main challenges concern climate pressures, mainly heat and droughts, during summer periods, that threaten to affect tourism rate, agricultural production and biodiversity, in particular.

Therefore, the main suggestions made by SITIA concerned the integration of indicators related to measures to support tourism rate (e.g. number of overnight stays), productivity in agriculture and employment in tourism and agricultural sectors. Flooding has been identified as another climate hazard that is affecting Sitia, for which however no substantial investment as to adaptation measures has been addressed yet.

4.2 Case Study 2: Trentino

Trentino represents one of the mountain regions most sensitive to climate change in southern Alps. Rising temperatures (+1.3° C since the 40s), more frequent heat waves, unpredictable precipitation patterns and modified seasonal snow-cover dynamics are the main climatic changes in the region, and they have a major effect on tourism, the environment safety and wellness of local communities. In view of these climate threats, the Autonomous Province of Trento has committed to develop and

deploy a provincial strategy of sustainable development that includes adaptation and mitigation measures such as energy effectiveness and electrification leveraging the surplus of local hydropower production (+65%), but also adaptation strategies based on increasing the resilience of economic sectors.

In relation to the KPI Panel, several indicators were suggested in addition to those already mapped, especially in relation to tourism. These concerned variation of tourism rates (e.g. ratio of number of nights in high versus low seasons, tourism facility extension period, total amount spent for initiatives in the tourism sector), as well as impact of tourism from an environmental point of view (e.g. water/electricity consumed by visitors in accommodation facilities or for other tourism-related services).

4.3 Case Study 3: Norrbotten

The case study area is located in the north of Sweden (area SE33-Upper Norrland), which is comprised of Västerbotten and Norrbotten counties, with a combined area of 15 million hectares (64% forest land). Important features of the regional economy are forestry, mining, hydro-electric power and Sami reindeer herding. In terms of climate change, the mainly affected sectors comprise the forestry sector (increasing the risk of forest fire, wind throw and insect and pathogen disturbance), agriculture (increased need for pesticides and fertilizers is expected), fisheries (the habitat of warm water species is expected to grow at the expense of cold-water species), the energy sector (disruptions in the electricity grid, flooded facilities and infrastructure as well as extremely low or high energy needs) as well as the culturally important reindeer herding. As such, many potential mitigation and adaptation measures have already been identified for each policy sector (e.g. needs-adapted fertilization and pest control, watercourse restoration, provision of alternative migratory routes for reindeer, adapted forest management, etc.). In relation to the KPI panel, many recommendations were made in relation to the integration of KPIs regarding biodiversity and land use, water pollution, CO₂ emissions and transportation.

4.4 Case Study 4: Murcia

Murcia region has an arid Mediterranean climate, low rainfall, limited water resources and soils with few nutrients. Being one of the largest producers of fruit, vegetables and flowers, Murcia region is often described as the "Garden of Europe". Main climate threats in the region concern the rise of temperature and desertification (soil erosion), which affect especially the agricultural sector, due also to unsustainable water management, but also tourism. Local municipalities have the potential competence to introduce mitigation and adaptation measures, but they have had difficulties to integrate climate change adaptation with local regulations.

Because of this, the main suggestions made for Murcia concerned the integration of indicators related to the agrifood industry, with specific focus on water management (e.g. water consumption and re-use, technologies to increase a sustainable water management, sea water treatment for human consumption, water contamination due to fertilizers and chemical waste), temperature variation and floods and droughts impact. These issues also concern the tourism sector.

4.5 Case Study 5: Danube

The Danube Delta (Tulcea county) is one of the most important wetlands in Europe, representing a nature reserve with a highly diverse fauna and flora and is declared a Biosphere Reserve. Ecological agriculture, tourism and environmental protection, services, renewable energy sources and heavy industry are important parts of the regional economy. Climate change has major implications for water supply, river runoff, agriculture and natural vegetation development. Extreme rainfall leads to extreme hydrological events, such as floods or droughts with a strong impact on the local economy and society. Potential mitigation and adaptation measures have already been identified and there is commitment

from the authorities and private sector to assess them: sustainable tourism promotion, agricultural niche activities (beekeeping), developing of eco-agriculture in small farms, increased availability of new and innovative technologies (e.g. wind turbine stations, biogas and biomass installations and solar panels), exploiting the potential use of renewable energy; and improving energy efficiency in the residential sector.

Considering this context, the main suggestions made by TULCEA in relation to the KPI panel were related to sustainable tourism promotion (e.g. number of overnight stays), transportation (e.g. transportation accessibility), and agriculture (especially in relation to water consumption for irrigation systems, productivity and the occurrence of droughts).

Conclusions

This report is an Explanatory Note accompanying D5.2 NEVERMORE KPI Panel and describes the structure and the methodology used for the definition of the panel. The D5.2 is an excel-based tool that contains the main KPIs identified for the evaluation of the policies and measures in the context of the NEVERMORE Project.

Based on the European Environment Agency (EEA) framework, the KPI panel considers the effectiveness and the efficiency indicators and addresses the main sectors deemed relevant for the five NEVERMORE case studies.

References

- European Environment Agency, EEA (2016). Environment and climate policy evaluation. doi:10.2800/68508



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This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101056858.



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D5.2 – NEVERMORE KPI panel

Responsible Partner: RINA

Main contributors: FBK, CARTIF,

NCSR, SIMAVI, CMCC, IVL, UVa, INFO, PAT, SITIA, TULCEA, EKNorr

The NEVERMORE KPI panel covers the three pillars of the sustainable development (environmental, social and economic effects of measures) and presents multi-impact indicators (effectiveness and efficiency) for both the disaster scenarios and adaptation and mitigation measures.

Category	KPI Name	Level of application	KPI Definition	Unit	Scale (EU, National, Local)	Source (if any)	Note	Agriculture, forestry and fishing	Mining and quarrying	Energy	Industry and commerce	Transport	Water and waste	Tourism/leisure/cultural heritage	Finance /Economy	Society	Biodiversity and natural heritage
Climate Hazards	Global Climate Risk Index	Efficiency	Investment required to reduce imperviousness of the global climate change risk	€ saved	EU, National	Schokker, J., Kamilaris, A., & Karatsiolis, S. (2021). A Review on Key Performance Indicators for Climate Change. Advances and New Trends in Environmental Informatics: A Bogeyman or Saviour for the UN Sustainability Goals?, 273-292.		y	y	y	y	y	y	y	y	y	y
Climate Hazards	Sea Level Rise and Coastal Flooding	Effectiveness	Most coastal regions experience increases in both absolute and relative sea level, the latter being more relevant for coastal protection.	cm of sea level rise	EU, National, Local	https://www.eea.europa.eu/ims/#c0=10&c12-operator=or&b_start=0							y				y
Climate Hazards	Sea Level Rise and Coastal Flooding	Efficiency	Investment required to reduce the impact or counteract the damages produced by the sea level rising, compared to baseline	€ saved	EU, National, Local	https://www.eea.europa.eu/ims/#c0=10&c12-operator=or&b_start=0							y				y
Climate Hazards	Fire Weather Index	Effectiveness	Assess fire risk based on meteorological conditions	Based on 24-hour accumulated precipitation and daily values of air temperature, relative humidity, and wind speed	EU, National, Local	https://www.eea.europa.eu/ims/#c0=10&c12-operator=or&b_start=0											y
Climate Hazards	Fire Weather Index	Efficiency	Investment required to reduce the fire risk and impact	€ saved	EU, National, Local	https://www.eea.europa.eu/ims/#c0=10&c12-operator=or&b_start=0											y
Climate Hazards	Sea surface temperature	Effectiveness	Monitors trends in average sea surface temperature anomalies	T °C	EU, National	https://www.eea.europa.eu/ims/#c0=10&c12-operator=or&b_start=0							y				y
Climate Hazards	Ocean acidification	Effectiveness	Illustrates the global mean average rate of ocean acidification, quantified by decreases in pH, which is a measure of acidity, defined as the hydrogen ion concentration.	pH	EU, National	https://www.eea.europa.eu/ims/#c0=10&c12-operator=or&b_start=0							y				y
Climate Hazards	Drought impact	Effectiveness	Severe negative annual productivity anomaly under drought pressured areas, i.e. under negative annual soil moisture anomaly.	Ha/year of land affected by drought	EU, National, Local	https://www.eea.europa.eu/ims/#c0=10&c12-operator=or&b_start=0											y
Climate Hazards	Drought impact	Efficiency	Investment required to decrease the drought impact	€/saved ha	EU, National, Local	https://www.eea.europa.eu/ims/#c0=10&c12-operator=or&b_start=0											y
Climate Hazards	Standardized Precipitation Index	Effectiveness	This indicator measures anomalies of accumulated precipitation during a given period (e.g. 1, 3, 12 months)	$H(x) = q + (1-q)G(x)$	EU, National, Local	https://climate-adapt.eea.europa.eu/en/metadata/map-graphs/spi-standardized-precipitation-index#:~:text=The%20Standardized%20Precipitation%20Index%20(SPI,of%20time%20at%20that%20location.		y			y		y	y	y	y	y
Energy	Total primary energy supply (TPES)	Effectiveness	Total energy supply (TES) is expressed in million tonnes of oil equivalent.	Tonnes of oil equivalent (toe), Millions	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Energy	Energy intensity, TPES per capita	Effectiveness	Energy intensity is calculated as TES per capita (toe/person).	Tonnes of oil equivalent (toe)	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Energy	Renewable energy supply, % total energy supply	Effectiveness	Renewable energy supply is calculated as a share of renewable sources in TES (expressed as percentage).	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							

Category	KPI Name	Level of application	KPI Definition	Unit	Scale (EU, National, Local)	Source (if any)	Note	Agriculture, forestry and fishing	Mining and quarrying	Energy	Industry and commerce	Transport	Water and waste	Tourism/leisure/cultural heritage	Finance/Economy	Society	Biodiversity and natural heritage
Energy	Renewable electricity, % total electricity generation	Effectiveness	Renewable electricity is calculated as a share of renewables in electricity production (%).	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Energy	Energy consumption in agriculture, % total energy consumption	Effectiveness	Energy consumption in agriculture is expressed as a share of total energy consumption (%).	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#		y		y							
Energy	Energy consumption in services, % total energy consumption	Effectiveness	Energy consumption in services is expressed as a share of total energy consumption (%).	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Energy	Energy consumption in industry, % total energy consumption	Effectiveness	Energy consumption in industry is expressed as a share of total energy consumption (%).	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y	y						
Energy	Energy consumption in transport, % total energy consumption	Effectiveness	Energy consumption in transport is expressed as a share of total energy consumption (%).	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y		y					
Energy	Energy consumption in other sectors, % total energy consumption	Effectiveness	Energy consumption in other sectors is expressed as a share of total energy consumption (%).	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Energy	Variation of energy consumption	Effectiveness	Variation of annual energy consumption.	Total energy consumption (%)	EU, National, Local			y	y	y	y	y	y	y	y	y	y
Energy	Variation of energy consumption	Efficiency	Investment required to achieve energy consumption reduction	€/saved kWh	EU, National, Local			y	y	y	y	y	y	y	y	y	y
Energy	Increased integration of RES	Effectiveness	Variation of the share of capacity from renewable energy sources	Total RES capacity (%)	EU, National, Local			y	y	y	y	y	y	y	y	y	y
Energy	Increased integration of RES	Efficiency	Investment required to increase the share of capacity from renewable energy sources	€/new RES kW	EU, National, Local			y	y	y	y	y	y	y	y	y	y
Energy	Tourism energy consumption	Effectiveness	Electric energy consumption per visitor	Kwh/visitor	EU, National, Local									y			
Food	Ecological footprint of consumption per person	Effectiveness	The Ecological Footprint per person is a measure of the rates of consumption and the total population of a country	gha/person	EU, National	Schokker, J., Kamilaris, A., & Karatsioli, S. (2021). A Review on Key Performance Indicators for Climate Change. <i>Advances and New Trends in Environmental Informatics: A Bogeyman or Saviour for the UN Sustainability Goals?</i> , 273-292.										y	
Food	Ecological footprint of consumption per person	Efficiency	Investment required to reduce the ecological footprint of consumption per person	€ spent/%variation in the Ecological Footprint	EU, National	Schokker, J., Kamilaris, A., & Karatsioli, S. (2021). A Review on Key Performance Indicators for Climate Change. <i>Advances and New Trends in Environmental Informatics: A Bogeyman or Saviour for the UN Sustainability Goals?</i> , 273-292.										y	
Land use	Marine protected area, % total exclusive economic zone	Effectiveness	Marine protected area is expressed as a percentage of total exclusive economic zone	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#							y	y			y
Land use	Investment to increase the % of marine protected area	Efficiency	Investment required to increase the % of marine protected area	€ spent/%variation in the number of marine protected area	EU, National									y			y
Land use	Terrestrial protected area, % land area	Effectiveness	Terrestrial protected area is expressed as a percentage of total land area.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#								y			y

Category	KPI Name	Level of application	KPI Definition	Unit	Scale (EU, National, Local)	Source (if any)	Note	Agriculture, forestry and fishing	Mining and quarrying	Energy	Industry and commerce	Transport	Water and waste	Tourism/leisure/cultural heritage	Finance/Economy	Society	Biodiversity and natural heritage
Resources consumption	Hazardous material generated	Effectiveness	Percent of production of harmful material over the total waste generated by the production system	Hazardous waste/total waste	EU, National, Local	https://denim-fof.eu/wp-content/uploads/2021/09/D3.3_Key-Performance-Indicators-for-Environmental-Economic-and-Social-Assessment.pdf			y	y	y	y	y				
Resources consumption	Hazardous material generated	Efficiency	Investment required to reduce the hazardous material generated	€ spent/% variation hazardous material generated over the total waste	EU, National, Local	https://denim-fof.eu/wp-content/uploads/2021/09/D3.3_Key-Performance-Indicators-for-Environmental-Economic-and-Social-Assessment.pdf			y		y		y				
Resources consumption	Recycled waste	Effectiveness	Percent of produced waste that is reused or recycled	Mass of recycled material/total production	EU, National, Local	https://denim-fof.eu/wp-content/uploads/2021/09/D3.3_Key-Performance-Indicators-for-Environmental-Economic-and-Social-Assessment.pdf		y	y	y	y	y	y	y	y	y	y
Resources consumption	Recycled waste	Efficiency	Investment required to increase the recycled waste	€ spent/% variation recycled waste	EU, National, Local	https://denim-fof.eu/wp-content/uploads/2021/09/D3.3_Key-Performance-Indicators-for-Environmental-Economic-and-Social-Assessment.pdf		y	y	y	y	y	y	y	y	y	y
Resources consumption	Water stress level	Effectiveness	The ability to meet a region's demand for water	Low-high ability to meet a region's demand for water	EU, National, Local	Schokker, J., Kamilaris, A., & Karatsiolis, S. (2021). A Review on Key Performance Indicators for Climate Change. Advances and New Trends in Environmental Informatics: A Bogeyman or Saviour for the UN Sustainability Goals?, 273-292.							y				
Resources consumption	Water stress level	Efficiency	Investment required to reduce the water stress level	€ spent/% variation water stress level	EU, National, Local	Schokker, J., Kamilaris, A., & Karatsiolis, S. (2021). A Review on Key Performance Indicators for Climate Change. Advances and New Trends in Environmental Informatics: A Bogeyman or Saviour for the UN Sustainability Goals?, 273-292.							y				
Resources consumption	Material footprint	Effectiveness	The amount of material extracted from nature to manufacture or provide the goods and services consumed by citizens	Mg of raw material equivalent	EU, National, Local	https://www.eea.europa.eu/ims/#c0=10&c12-operator=or&b_start=2					y		y		y		
Resources consumption	Material footprint	Efficiency	Investment required to reduce material footprint	€/avoided equivalent raw material extraction	EU, National, Local	https://www.eea.europa.eu/ims/#c0=10&c12-operator=or&b_start=2					y		y		y		
Resources consumption	Tourism water consumption	Effectiveness	Water consumption per visitor	m3/visitor	EU, National, local									y			
Resources consumption	Desalinated water consumption	Effectiveness	Desalinated water consumption	m3/population	EU, National, local			y			y		y	y			
Resources consumption	Water consumption for snow production	Effectiveness	Water consumption for snow production	m3/visitor	EU, National, local									y			
Resources consumption	Energy consumption for snow production	Effectiveness	Energy consumption for snow production	Kwh/ visitor	EU, National, local									y			

Economic Pillar

Category	KPI Name	Level of application	KPI Definition	Unit	Scale (EU, National, Local)	Source (if any)	Note	Agriculture, forestry and fishing	Mining and quarrying	Energy	Industry and commerce	Transport	Water and waste	Tourism/leisure/cultural heritage	Finance/Economy	Society	Biodiversity and natural heritage
Economic Growth	Sectoral Real GDP	Effectiveness	Real GDP of a specific sector, as a % of the total GDP of the region	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH_H#		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economic Growth	GDP Growth Contribution	Effectiveness	Variation in total GDP Growth once the policy is implemented, compared to a no-policy scenario	Growth GDP (with policy) / Growth GDP (no-policy)	EU, National	Based on previous indicators and applying effectiveness logic		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economic Growth	GDP Growth Contribution (investment)	Efficiency	Policy-cost / Investment required (as a % of the Real GDP) to achieve the GDP Growth Contribution	(Policy Cost or Investment / GDP Real) / GDP Growth Contribution (Percentage)	EU, National	Based on previous indicators and applying efficiency logic		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economic Growth	GNI	Effectiveness	Gross national income (GNI) is defined as gross domestic product, plus net receipts from abroad of compensation of employees, property income and net taxes less subsidies on production.	Annual GNI	EU, National			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economic Growth	GNI per cápita	Efficiency	Annual Gross National Income (GNI) per cápita	Annual GNI per cápita	EU, National	https://data.worldbank.org/indicator/NY.GNP.PCAP.CD		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economic Growth	Unemployment Rate	Effectiveness	Percentage of the labour force unemployed (working-age residents without work divided by total labour force)	% of unemployment	EU, National			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Economic Growth	Tourism GDP (direct as % of total GDP)	Effectiveness	Measured as the % of GDP deriving from the tourism sector out of total GDP	% GDP	EU, National	https://stats.oecd.org/index.aspx?DataSetCode=TOURISM_KEY_IND_PC								Y			
Economic Growth	Exports of goods and services (% of GDP)	Effectiveness	Transactions in goods and services (sales, barter, and gifts) from residents to non-residents.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH_H#									Y		
Economic Growth	Imports of goods and services (% of GDP)	Effectiveness	Transactions in goods and services (sales, barter, and gifts) from residents to non-residents.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH_H#									Y		
Economic Growth	Export value index	Effectiveness	Export values are the current value of exports (f.o.b.) converted to U.S. dollars and expressed as a percentage of the average for the base period (2000)	Export value index	EU, National	https://data.worldbank.org/indicator/TX.VAL.MRCH.XD.WD									Y		
Economic Growth	Import value index	Effectiveness	Import unit value indices come from UNCTAD's trade database. Unit value indices are based on data reported by countries that demonstrate consistency under UNCTAD quality controls, supplemented by UNCTAD's estimates using the previous year's trade values at the Standard International Trade Classification three-digit level as weights.	Import value index	EU, National	https://data.worldbank.org/indicator/TM.UVI.MRCH.XD.WD									Y		
Economic Growth	GDP per capita	Effectiveness	GDP per capita is the sum of gross value added by all resident producers in the economy plus any product taxes (less subsidies) not included in the valuation of output, divided by mid-year population.	GDP/total population	EU, National	http://wdi.worldbank.org/table/WV.1		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Environmental taxes and transfers	Environmentally related taxes, % GDP	Effectiveness	Environmentally related tax revenue is expressed as a percentage of GDP.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH_H#						Y					
Environmental taxes and transfers	Environmentally related taxes, % total tax revenue	Effectiveness	Environmentally related tax revenue is expressed as a percentage of total tax revenue.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH_H#						Y					
Environmental taxes and transfers	Energy related tax revenue, % total environmental tax revenue	Effectiveness	Energy related tax revenue is expressed as a percentage of environmentally related tax revenue.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH_H#				Y		Y					

Category	KPI Name	Level of application	KPI Definition	Unit	Scale (EU, National, Local)	Source (if any)	Note	Agriculture, forestry and fishing	Mining and quarrying	Energy	Industry and commerce	Transport	Water and waste	Tourism/leisure/cultural heritage	Finance/Economy	Society	Biodiversity and natural heritage
Environmental taxes and transfers	Road transport-related tax revenue, % total environmental tax revenue	Effectiveness	Tax revenue related to motor vehicles used in road transport is expressed as a percentage of all environmentally related tax revenue	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#						y					
Environmental taxes and transfers	Emissions priced above EUR 30 per tonne of CO2, % total emissions	Effectiveness	Emissions priced above EUR 30 per tonne of CO2 are expressed as a percentage of total CO2 emissions.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Emissions priced above EUR 60 per tonne of CO2, % total emissions	Effectiveness	Emissions priced above EUR 60 per tonne of CO2 are expressed as a percentage of total CO2 emissions.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Emissions priced above EUR 120 per tonne of CO2, % total emissions	Effectiveness	Emissions priced above EUR 120 per tonne of CO2 are expressed as a percentage of total CO2 emissions.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Diesel tax, USD per litre	Effectiveness	Tax rates per litre of diesel fuel are expressed at constant 2015 USD using PPP.	US dollars per litre, 2015	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Diesel end-user price, USD per litre	Effectiveness	Household end-user price per litre of diesel is expressed at constant 2015 USD using PPP. It is deflated using the Consumer Price Index	US dollars per litre, 2015	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Petrol tax, USD per litre	Effectiveness	Tax rates per litre of petrol are expressed at constant 2015 USD using PPP.	US dollars per litre, 2015	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Petrol end-user price, USD per litre	Effectiveness	Household end-user price per litre of petrol is expressed at constant 2015 USD using PPP. I	US dollars per litre, 2015	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Residential electricity price, USD per kWh	Effectiveness	Residential electricity prices are expressed at constant 2015 USD using PPP per kilowatt-hour.	US Dollar, 2015	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Industry electricity price, USD per kWh	Effectiveness	Industry electricity prices are expressed at constant 2015 USD using PPP per kilowatt-hour.	US Dollar, 2015	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Mean feed-in tariff for solar PV electricity generation	Effectiveness	Feed-in tariffs (FITs) for solar photovoltaic are expressed at current USD per kWh.	US Dollar	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Mean feed-in tariff for wind electricity generation	Effectiveness	Feed-in tariffs (FITs) for wind are expressed at current USD per kWh.	US Dollar	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Fossil fuel consumer support, % total tax revenue	Efficiency	Support for the consumption of fossil fuels is expressed as a percentage of total tax revenue.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Fossil fuel consumer support, % energy related tax revenue	Efficiency	Support for the consumption of fossil fuels is expressed as a percentage of energy-related tax revenue.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Fossil fuel consumer support, % total fossil fuel support	Efficiency	Support for the consumption of fossil fuels is expressed as a percentage of total fossil fuel support.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Fossil fuel producer support, % total fossil fuel support	Efficiency	Support for the production of fossil fuels is expressed as a percentage of total fossil fuel support.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							
Environmental taxes and transfers	Fossil fuel general services support, % total fossil fuel support	Efficiency	General services support is expressed as a percentage of total fossil fuel support.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y							

Category	KPI Name	Level of application	KPI Definition	Unit	Scale (EU, National, Local)	Source (if any)	Note	Agriculture, forestry and fishing	Mining and quarrying	Energy	Industry and commerce	Transport	Water and waste	Tourism/leisure/cultural heritage	Finance/Economy	Society	Biodiversity and natural heritage
International financial flows: Official Development Assistance	ODA - renewable energy sector, % total allocable ODA	Effectiveness	Official Development Assistance allocated to renewable energy is expressed as a percentage of total sector-allocable ODA.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y					y		y
International financial flows: Official Development Assistance	ODA - water supply and sanitation sector, % total allocable ODA	Effectiveness	Official Development Assistance allocated to the water supply and sanitation sector is expressed as a percentage of total sector-allocable ODA.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#							y		y		
International financial flows: Official Development Assistance	ODA - environment sector, % total allocable ODA	Effectiveness	Official Development Assistance allocated to environmental protection activities is expressed as a percentage of total sector-allocable ODA.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#									y		
International financial flows: Official Development Assistance	Net ODA provided, % GNI	Effectiveness	Net official development assistance (ODA) provided is expressed as a percentage of Gross National Income.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#									y		
Technology and innovation: Patents	Development of environment-related technologies, % all technologies	Effectiveness	The number of environment-related inventions is expressed as a percentage of all domestic inventions (in all technologies). Changes in 'environmental' technological innovation can then be interpreted in relation to innovation in general.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#						y					
Technology and innovation: Patents	Relative advantage in environment-related technology	Effectiveness	The relative advantage in environment-related technologies is an index of the specialisation in environmental innovation of a given region relative to the world average.	Ratio	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#						y					
Technology and innovation: Patents	Development of environment-related technologies, % inventions worldwide	Effectiveness	The number of environment-related inventions is expressed as a percentage of environment-related inventions worldwide.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#						y					
Technology and innovation: Patents	Development of environment-related technologies, inventions per capita	Effectiveness	The number of environment-related inventions is expressed per million residents (higher-value inventions/million persons).	Number of inventions	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#						y					
Technology and innovation: R&D	Environmentally related government R&D budget, % total government R&D	Effectiveness	Government budget for R&D refers to Government Budget Appropriations or Outlays for Research and Development (GBAORD), that measure the funds that government allocate to R&D to meet various socio-economic objectives.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#									y		
Technology and innovation: R&D	Environmentally related R&D expenditure, % GDP	Effectiveness	R&D expenditure refers to Gross domestic Expenditure on Research and Development (GERD) measured as total intramural (= business enterprise + government + higher education + private non-profit) R&D expenditure in various socio-economic objectives.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#									y		

Category	KPI Name	Level of application	KPI Definition	Unit	Scale (EU, National, Local)	Source (if any)	Note	Agriculture, forestry and fishing	Mining and quarrying	Energy	Industry and commerce	Transport	Water and waste	Tourism/leisure/cultural heritage	Finance/Economy	Society	Biodiversity and natural heritage
Technology and innovation: R&D	Renewable energy public RD&D budget, % total energy public RD&D	Effectiveness	Public budget directed at research, development and demonstration (RD&D) related to renewable energy, including hydro, geothermal, solar (thermal and PV), wind and tide/wave/ocean energy, as well as combustible renewables (solid biomass, liquid biomass, biogas) and other renewable energy technologies (all supporting measuring, monitoring and verifying technologies in renewable energies).	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#									y		
Technology and innovation: R&D	Energy public RD&D budget, % GDP	Effectiveness	Energy RD&D public budget is expressed as a percentage of GDP. This indicator allows the Renewable energy public RD&D budget (see above) to be put into a broader context.	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y					y		
Technology and innovation: R&D	Fossil fuel public RD&D budget (excluding CCS), % total energy public RD&D	Effectiveness	Public budget directed at research, development and demonstration (RD&D) related to fossil fuels, including oil, gas and coal and excluding RD&D related to CO2 capture and storage (CCS). They are expressed as a percentage of total energy RD&D public budgets (directed at all forms of energy).	Percentage	EU, National	https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#				y					y		
Tourism	Tourism Sustainable Development Index	Efficiency	Investment required to increase the TSDI	€ spend/variation in TSDI	EU, National									y			
Tourism	Tourism Sustainable Development Index	Effectiveness	Variation in TSDI	% variation	EU, National									y			
Tourism	Tourism rate (number of nights/year)	Effectiveness	Number of nights spent by tourists	number nights/year	EU, National, Local									y			
Tourism	Tourism intensity	Effectiveness	Number of tourists as a percentage of total population	tourists %/population	EU, National, Local									y			
Tourism	Tourism offering opening extension	Effectiveness	Tourism facility extension period	Number of days/year	Local									y			
Tourism	Tourism distribution	Effectiveness	Ratio of number of nights in high versus low seasons	No. nights in high season/No. nights in low season	EU, National, Local									y			
Tourism	Investments in tourism	Efficiency	Total amount spent for initiatives in the tourism sector	€/visitor	EU, National, Local									y			
Tourism	Initiatives in tourism sector	Efficiency	Number of initiatives in high seasons	No. initiatives per year	EU, National, Local									y			