



Module Training Document

T.3.3 Training activities for endorsing the EE1st principle in the regional decision support



Co-funded by the European Union under project n°101076088. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

Project Acronym	REGIO1ST
Project Name	Implementing the Energy Efficiency First Principle in Regional Planning
Project Coordinator	Vlasis Oikonomou, IEECP
Project Duration	36 Months
Website	https://regio1st-planning-framework.fedarene.org/

Deliverable No.	T.3.3 Training activities for endorsing the EE1st principle in the regional decision support
Dissemination Level	Project Partners / Selected
Work Package	WP3
Lead beneficiary	SEEA
Author(s)	Stavros Spiridakos s.spiridakos@clube.gr ; Natalia Boemi n.boemi@clube.gr ; Stefania Zourka <s.zourka@clube.gr> Francisco Gayo Francisco Gayo López <franciscogl@faen.es> Cesar Valmaseda <cesar.valmaseda@faen.es> George Konstantopoulos <gkonstantopoulos@epu.ntua.gr>
Reviewed by	Michael Doran mdoran@southeastenergy.ie
Date	12/01/2024
File Name	Regio1st Module Training Document

Legal Notice

The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither CINEA nor the European Commission is responsible for any use that may be made of the information contained therein.

Published in 2025 by Regio1st.

©Regio1st, 2025. Reproduction is authorised provided the source is acknowledged.

PREFACE

Training activities for endorsing the EE1st principle in the regional decision support are based on the materials set out in T2.4. T2.4 provides the framework for REGIO1ST in 8 stages, from Stage 1: Preparation through to Stage 8: Implementation, Monitoring and Review. T3.3 will provide a coherent training and guidance package for assisting the six Regio1st regional authorities (and beyond during the exploitation activities in WP6 for 100 regions) in undertaking the steps of T3.2. More specifically, it will provide ad-hoc and upon demand trainings to familiarize the users with the functionalities, components and methodology, to explain and provide information and examples of all the main features of the decision support process, to train the users on how to use the framework and the respective tools. For the data required per region to include in the decision support, the ENERGEEWATCH will be used as a benchmark through the data from the regional observatories.

Module	Partner Responsible
Stage 1. Preparation	SEEA
Stage 2. Engaging Stakeholders & building partnerships	LEASP/ Menea / Faen / CluBE
Stage 3: Reviewing energy objectives and targets	Clube / Faen
Stage 4. Exploring the current regional energy system	LEASP/ Menea / Faen
Stage 5: Cost benefit analysis	Fraunhofer / IEECP
Stage 6: Assessing the practical feasibility of least cost energy solutions	Fraunhofer / IEECP / ICCS
Stage 7: Defining actions and developing the regional energy plan	IEECP / ICCS
Stage 8: Implementation, monitoring and review	IEECP (Lead) / Clube / SEEA

Contents

1	Introduction to Stage 3	6
1.1	Brief Overview	6
1.2	Connection to Energy Planning	6
2	Methodology	6
2.1	·Step 1: Review National Visions and Targets,	8
2.2	·Step 2: Review Regional Visions and Targets,	8
2.3	·Step 3: Set and define new regional objectives and targets,	9
2.4	·Step 4: Discuss visions and targets with stakeholders	9
3	Reviewing National Visions and Targets	10
3.1	EU Visions and Targets	10
3.2	National Case Studies	11
3.2.1	Brief overviews	11
3.2.2	Spain	11
3.2.3	Greece	16
3.3	Alignment with Broader Policy Frameworks	22
3.4	Target evaluation	26
3.4.1	Consistency	26
3.4.2	Coherence of the plan	26
3.4.3	Information	27
4	Reviewing Regional Visions and Targets	27
4.1	Regional Visions and Targets	27
4.1.1	Region of Asturias	27
4.1.2	Region of Western Macedonia	29
4.2	Comparison with EU Targets	30
4.3	Comparison with National Targets	32
4.3.1	Asturias – Spain	32

4.4	Evaluating the Progress of the Objectives and Targets – Evaluating Regional Plans.....	34
4.5	Identifying Synergies and Gaps	35
4.5.1	Region of Asturias	35
4.5.2	Region of Western Macedonia.....	35
5	Setting New Regional Objectives and Targets – Implementation of the stakeholder 38	
5.1	Discussion with stakeholder – Establishing Priorities	38
5.2	Defining New or Revised Objectives	39
5.2.1	Consideration of Factors	40
5.3	Review the New Regional Objectives and Targets	40
6	Conclusion	41

1 Introduction to Stage 3

1.1 Brief Overview

As the field of energy management continues to develop, the evaluation of energy goals and objectives is a critical component in the attempt to achieve sustainability and resilience. This stage addresses the critical importance of the continuous assessment, placing particular emphasis on its function of maintaining the adaptability of energy strategies to the continually shifting challenges of our society.

1.2 Connection to Energy Planning

The review process of EU energy targets, combined with national and regional objectives is pivotal in the overall energy planning process. The comprehensive evaluation mechanism of EU, national and regional targets and objectives on energy efficiency is essential for navigating the dynamic energy landscape and ensuring that policies align with broader sustainability objectives. At its core, the following review process entails a rigorous evaluation of progress toward defined energy targets at both the EU and national/regional levels. This requires a thorough review of data on energy efficiency goals deriving from EU, national and regional energy plans. The stakeholders involved in the decision-making process obtain vital insights into the effectiveness of current policies and priorities by assessing achievements and identifying deficiencies. Furthermore, the review process contributes to the identification and resolution of issues that may slow down the progress toward reaching energy targets. From the technological and economic barriers to the regulatory and societal restrictions, a detailed knowledge of the difficulties allows policymakers to adjust their plans and conduct targeted actions.

2 Methodology

A methodological framework is put in place by REGIO1ST to incorporate the EE1st principle into regional energy planning. [The REGIO1st Planning Framework](#) provides a comprehensive, structured approach for regional energy planners in Europe to develop and implement sustainable, cost-effective energy strategies while prioritizing energy savings in buildings, system flexibilities and other energy efficiency solutions in line with the Energy Efficiency First (EE1st) principle.

This framework is designed to facilitate collaboration among stakeholders, align with broader national goals, and address the unique challenges and opportunities of each region.



Figure 1: REGIO1ST Planning Framework Stages

Stage 3 focuses on reviewing and establishing energy objectives and targets that align with national, regional and local visions, as well as engaging stakeholders to ensure a shared and well-informed approach. This stage 3 is distributed in four steps, as follow:

- Step 1: Review National Visions and Targets,
- Step 2: Review Regional Visions and Targets,
- Step 3: Set and define new regional objectives and targets,
- Step 4: Discuss visions and targets with stakeholders

2.1 · Step 1: Review National Visions and Targets,

In this step, planners should review relevant national energy policies, strategies, and targets. Such plans may include objectives related to greenhouse gas emissions reductions, renewable energy deployment, energy efficiency improvements, transport infrastructure development and energy security, among others.

Understanding the national context and national priorities will help ensure that the regional energy plan aligns with broader policy frameworks.

At this stage 3 and step 1, REGIO1ST provide a tool a National and Regional Targets Comparison Template [[download](#)]. This template can help planners systematically compare their regional energy targets with EU, national and other objectives, such as the European Union's energy and climate goals. The template includes columns for each target type (e.g., greenhouse gas emissions reduction, renewable energy share, energy efficiency) and rows for filling in national, regional, and other targets, enabling planners to identify deviations and areas for review.

2.2 · Step 2: Review Regional Visions and Targets,

In addition to national targets, planners should examine existing regional and local visions, strategies, and targets for energy, as well as for other relevant policy areas. For instance, planners could review, amongst other, regional development plans, energy master plans, urban mobility plans, regional spatial/territorial plans, waste management plans and other relevant strategic documents that affect energy policy.

Evaluating existing regional and local targets, strategies and plans will help identify synergies, gaps, and potential conflicts at a regional level as well as between different levels of governance. This will ensure that the regional energy plan is consistent with and builds upon existing planning efforts.

This step is also supported for the aforementioned National and Regional Targets Comparison tool.

2.3 - Step 3: Set and define new regional objectives and targets,

In this step, the new/revised regional objectives, priorities and targets need to be defined, considering existing national regional and local targets and strategies. These should also consider economic development, long-term energy independence, environmental protection, improvement of quality of life and of health. In addition, appropriate indicators need to be identified to better define set objectives.

2.4 - Step 4: Discuss visions and targets with stakeholders

Once national, regional, and local visions, targets, strategies, and plans have been reviewed, planners should engage with stakeholders to discuss these and their implication on the regional energy plan. The dialogue should aim to:

- Identify potential barriers and opportunities for achieving established goals in order to consider them further in the regional plan
- Ensure that regional needs and stakeholder concerns are adequately reflected in the regional plan and sufficiently considered in new/revised objectives and targets
- Build consensus on the regional energy vision, objectives, and targets
- Rank the importance of objectives to build consensus on priorities Stakeholder engagement may take the form of workshops, meetings, or online consultations, depending on the resources available and the preferences of the stakeholders involved.

Stakeholder engagement may take the form of workshops, meetings, or online consultations, depending on the resources available and the preferences of the stakeholders involved.

To do that, REGIO1ST project provides a Participatory Priorities Ranking Tool [[Download](#)]. This tool can facilitate planners rank priorities using a collaborative process. It provides a systematic approach for gathering inputs and perspectives from a diverse group of stakeholders, such as community members, experts, or decision-makers, and collectively determining the relative importance / urgency of different options / measures. By actively involving stakeholders, a more inclusive and representative prioritization process is ensured, ultimately leading to more effective and sustainable outcomes.

3 Reviewing National Visions and Targets

3.1 EU Visions and Targets

The European Union's strategic approach on Energy Efficiency focuses on the need for extensive energy efficiency improvements throughout the whole energy supply chain, from production to final consumption.

Since July 2021, the European Commission has taken decisive steps toward advancing the objectives outlined in the Energy Efficiency Directive (EED) 2012/27/EU, which is an integral component of the European Green Deal. Aligned with the broader goal of reducing greenhouse gas emissions by a substantial 55% by 2030, the Commission proposed a comprehensive recast of the Energy Efficiency Directive (EED) 2023/ 1791, introducing a more robust and binding EU energy efficiency target. The abovementioned progressive adjustment paved the way for the culmination of a consensus among co-legislators, resulting in the increased final energy efficiency target of 11.7%. The recast Energy Efficiency Directive that entered into force on 10 October 2023 solidifies the commitment of the European Union to an elevated standard of energy efficiency. The target represents a nuanced response to the evolving energy landscape, ensuring that the EU not only aligns with its environmental objectives, but also establishes a resilient common ground for its member states to ensure the reduced dependence on external fossil fuel sources, enforcing the framework of the REPowerEU strategic plan.

In order to achieve the abovementioned energy efficiency targets, the EU emphasizes on the implementation of targeted measures in policy areas that offer the greatest potential for energy savings, demonstrating a coordinated and strategic focus. The legislative revisions, embodied in the Energy Efficiency Directive (recast), introduce new binding targets for EU countries, demanding an average annual energy savings rate of 1.49% from 2024 to 2030. This marks a substantial increase from the previous requirement of 0.8% in the period 2021–2023. These targets aim to foster energy savings in critical sectors such as buildings, industry, and transportation, promoting sustainability across the economy. The public sector's exceptional contribution is particularly noteworthy, as evidenced by a new 1.9% annual energy consumption reduction objective. This demonstrates the EU's commitment to setting an example and ensuring that public institutions actively contribute to the overall energy efficiency goals. Furthermore, extending the yearly 3% building renovation mandate to all levels of government demonstrates a broad and inclusive approach to improving energy efficiency in the built environment.

Additionally, as far as final energy consumption is concerned, the Energy Efficiency Directive (recast) has set a final energy consumption target of 763 million tonnes of oil equivalent (Mtoe) by 2030, reflecting a considerable reduction from the previous target. This underlines the EU's target to optimize energy use, exceeding previous commitments and cementing its position as a global leader in sustainable energy policies.

In conclusion, the evolution of the EU's energy efficiency targets, from its initial objective of 9% in July 2021 to the agreed-upon target of 11.7%, demonstrates a dynamic and strategic approach at the European level. This evolution demonstrates the EU's agility and dedication to remaining at the forefront of sustainable energy practices, which contributes considerably to the overarching goals of environmental conservation and energy security. By setting and exceeding proactive goals, the EU not only addresses current economic and environmental problems, but also positions itself as a leader in the global transition to a more sustainable and energy-efficient paradigm.

3.2 National Case Studies

3.2.1 Brief overviews

Year of objective: 2021	Greece	Spain
Population	10,4 million	47 million
Covering area	131,957 square kilometers	505.992 square kilometers
Key economy sectors	Tourism, Shipping, Agriculture, Renewable Energy	Tourism, Agriculture, Industry, Renewable Energy

3.2.2 Spain

Making Spain carbon neutral by 2050 in the context of acceleration in the decarbonization of the global economy after the signing of the Paris Agreement on Climate Change in 2015. It highlights the transformation from traditional energy models to low-carbon models, promoting energy-efficient technologies, renewable sources, and developments such as renewable hydrogen. The European Union has solidified its

strategy for a low-emission economy, presenting the European Green Deal in 2019 with specific goals for 2050. The European Climate Law is mentioned as a legal framework for emission reduction. This shift has significant implications for regions like Asturias, heavily tied to coal in its economy. The transformation of the energy sector is addressed through a legislative package, including directives and regulations on promoting renewable energy, energy efficiency, and the governance of the Union for Energy and Climate Action. The text highlights objectives for 2030 within this legislative framework.

As an additional component, the "Clean Energy for All" package introduces various legislative provisions through Directive (EU) 2019/944, establishing common rules for the internal electricity market, and Regulation (EU) 2019/943, also related to the internal electricity market. This aims to establish the principles of a new configuration of the electricity market in the context of the energy transition.

In the past year, as a result of strategies associated with the European Green Deal, new objectives have been set regarding emission reduction. In September 2020, the "Plan for the 2030 Climate Target" was agreed upon, with the goal of reducing CO₂ emissions by 55% by 2030. In December 2020, the European Climate Pact was launched, a European Union-wide initiative encouraging individuals, communities, and organizations to participate in climate action and contribute to building a more sustainable Europe.

In line with the goal of positioning Europe as the first continent with neutral emissions, Spain approved the Long-Term Decarbonization Strategy (ELP) on November 3, 2020, with the aim of achieving climate neutrality by 2050. This strategy outlines a path to reduce greenhouse gas (GHG) emissions by 90% by 2050 compared to 1990. This involves reducing CO₂ emissions from 334 million equivalent tons (MtCO₂eq) in 2018 to a maximum of 29 MtCO₂eq by 2050. The remaining emissions will be absorbed through carbon sinks, capable of capturing around 37 MtCO₂eq by mid-century, thereby achieving climate neutrality.

The ELP is positioned as an essential component that complements the Government's Energy and Climate Framework, along with the Climate Change and Energy Transition Law, the Just Transition Strategy, the Energy Poverty Strategy, the National Plan for Climate Change Adaptation, and, notably, the National Integrated Energy and Climate Plan (2021-2030).

Table 1 shows the total GHG emission by sector in Spain from 1990 to 2021.

Table 1. Total GHG emissions (in kt CO₂ eq) by sector

YEAR	1990	2005	2011	2021
------	------	------	------	------

Energy	213,191.25	344,337.23	268,251.06	216,048.45
IPPU	27,963.52	43,104.39	36,350.02	24,126.53
Agriculture	33,022.58	35,896.95	32,688.33	34,369.39
Waste	13,532.92	15,421.06	17,342.74	14,303.44
Total	287,710.27	438,759.63	354,632.15	288,847.82

Source: <https://otea.info>

The National Integrated Energy and Climate Plan (NECP) 2021–2030 serves as the guiding document for national energy transition, setting objectives for reducing greenhouse gas emissions, integrating renewable energy, and improving energy efficiency by sector. It also outlines policies and measures to achieve these goals. Key objectives proposed by the PNIEC for 2030 include:

- 23% reduction in greenhouse gas (GHG) emissions compared to 1990
- 42% share of renewables in energy end-use
- 39.5% improvement in energy efficiency
- 74% share of renewable energy in electricity generation

In line with this approach, the European Union has strengthened its strategy, initiated decades ago, to progress toward a low-emission economy. On December 11, 2019, the European Commission introduced the European Green Deal, a growth strategy aimed at transforming the European Union into a modern, resource-efficient, and competitive economy. The objective is to achieve net-zero greenhouse gas emissions by 2050, realizing economic growth decoupled from resource use and ensuring that no individual or region is left behind. This deal is grounded in nine areas of action, with a particular emphasis on those related to energy transition, such as "clean energy," "sustainable industry," "construction and renovation," and "sustainable mobility."

Table 2 shows the evaluation and comparison between different sectors including the new values and forecast according to the draft of NECP 2023. Furthermore, real data of 2021 are included.

Table 2. Total GHG emissions and forecast (in kt CO₂ eq)) by sector

Year of objective: 2030	Real Data (2011)	NECP 2021	NECP 2023 (Preliminary draft revised version)	EU core objectives	Real data (2021)
Reduction in greenhouse gas (GHG) emissions compared to 1990	-23.4%	23%	32%	55%	-0.4%
Reduction in greenhouse gas (GHG) emissions compared to 2005	19.1%	60%	55%	22.7%	34.2%
Share of renewables in gross final energy consumption	18%	42%	48%	42.5%	22%
Energy efficiency improvements	6,6%	39.5%	44%	11.7%	12.6%

Source: <https://otea.info>

To achieve this, a framework will be established for the progressive and irreversible reduction of greenhouse gas emissions and the increase in absorptions by natural sinks or other means in the Union. The ultimate goal is that, no later than 2050, greenhouse gas emissions and absorptions are balanced, resulting in net-zero emissions. In this manner, specific objectives for the region of Asturias by 2050 are outlined:

- 90% in total gross greenhouse gas (GHG) emissions by 2050 compared to 1990.

- 100% renewable electricity system

The total investments to achieve the objectives of the Plan will amount to EUR 241.412 billion between 2021 and 2030. Of this amount, EUR 196 billion are additional investments compared to the Baseline Scenario (without additional policies). The total investments are distributed between:

- Saving and efficiency: 35% (€83.540 bn)
- Renewable energy: 38% (€91.765 bn)
- Networks and electrification: 24% (€58.579 bn)
- Other measures: 3% (€7.528 bn)

Apart from that and more coal specific:

In the case of the Balearic Islands, the existing coal-fired power station will close two of its four generator sets by 2020, leaving the remaining two as a reserve until the effective integration of the Balearic electricity system into the mainland system.

In 2020, Spain published its first National Integrated Energy and Climate Plan for the 2021-2030 period, outlining Spain's commitments for climate and energy by 2030. The document received a positive assessment from the European Commission, which acknowledged its ambition. Other analyses from international organizations, civil society entities, and economic analysts also noted Spain's ambitious and clear objectives and framework. Public participation played a central role in developing the 2021-2030 plan, and it included a strategic environmental study, ensuring compatibility between renewable development and biodiversity conservation. The draft update for the 2023-2030 plan aims for objectives aligned with European emission reduction goals, targeting the following outcomes by 2030:

- 32% reduction in greenhouse gas emissions compared to 1990
- 48% renewables in final energy consumption
- 44% improvement in energy efficiency in terms of final energy
- 81% renewable energy in electricity generation
- Reduction of energy dependency by up to 51%

Many of the measures introduced in this Plan also represent a transformation of the energy system towards a more resilient model in the face of climate change. The development of this Plan is, in that sense, one of the first steps towards building adaptive capacity and providing actions for better adaptation of the energy system. Data collection and projection development are a necessary approach to transform the energy system so that action guidelines and policy design can be derived, aiming to achieve a carbon-neutral economy

3.2.3 Greece

Firstly, the primary objective that Greece has set is to become carbon neutral by 2050, demonstrates a commitment to sustainable and environmentally friendly policies. The interim targets set for 2030 can contribute significantly in this direction. These targets and objectives are imprinted in the Greek National Climate Law, in the National Energy and Climate Plan as well as in the Recovery and Resilience Plan “Greece 2.0”. In the light of achieving the abovementioned objectives and targets Greece aims to significantly reduce greenhouse gas (GHG) emissions by 2030. The objective set is to reduce emissions by 42% compared to 1990 levels, and even more ambitiously, 56% compared to 2005 levels. These reductions not only demonstrate a commitment to climate change mitigation, but also are consistent with broader global initiatives to reduce emissions. Furthermore, the strategy aims to achieve a 35% proportion of renewables in gross final energy consumption by 2030. This ambition is consistent with the core EU target for renewable energy sources.

This target is consistent with the main EU aim for Renewable Energy Sources (RES) of 32%, demonstrating Greece's commitment to leading in sustainable energy policies. Furthermore, the plan aims to increase qualitative energy efficiency by 38% in final energy use by 2030. This exceeds the core EU target of 32.5%, demonstrating Greece's commitment to increasing energy efficiency and lowering overall energy usage. In essence, these 2030 targets are critical milestones on the way to carbon neutrality by 2050, showing Greece's comprehensive and ambitious approach to environmental sustainability.

It is crucial to mention that the substantial phase-out of lignite production which lead to the closure of lignite plants contributed to the achievement of the abovementioned objectives and targets. More specifically, the production facilities have already been officially shut down and withdrawn since 2012, are the Units I, II, III, and IV of the Ptolemaida NPP, as well as Units I and II of the Liptol NPP, Units I, II, III, and IV at Aliveri NPP. Keratea-Lavrio NPP Unit 8 and 9 The Agios Georgios NPP, Kardias NPP Units I and II, Amyndeon – Filota NPP Units I and II, Amyndeon Field Mine, Kardias Field Mine, and Megalopolis Mines were expected to cease production by the end of 2023. The Public Power Corporation (PPC) has already developed a detailed strategy for quick delignification. In this regard, mine closure and operational optimisation of lignite production are envisaged, together with optimal environmental restoration and utilization of the corresponding locations, using circular economy concepts.

In recent years, Greece has implemented proactive initiatives to reduce greenhouse gas emissions. In 2022, it exacerbated its National Energy and Climate Plan targets and pledged to reducing GHG emissions by 55% by 2030 and 80% by 2040 compared to 1990 levels, aligning with EU-level ambitions.

Table 3. Total GHG emissions (in kt CO₂ eq)) by sector

YEAR	1990	2005	2011*	2021
Energy	77,133.43 7	107,379.67	92,161.13	53,598.90
IPPU	10,933.61	14,774.73	10,044.05	9,991.75
Agriculture	10,534.68	9,337.32	8,965.32	8,045.99
Waste	5,383.97	5,256.42	5,008.62	5,852.19
Total	103,985.69 1	136,748.14	116,179.12 1	77,488.83

* The year 2011 was purposefully included in our dataset, since the World Meteorological Organization (WMO) declared that greenhouse gas emissions in the atmosphere had reached unprecedented levels.

Making Greece carbon neutral by 2050.

2030:

- 42% reduction in greenhouse gas (GHG) emissions compared to 1990
- 56% reduction in greenhouse gas (GHG) emissions compared to 2005
- 35% share of renewables in gross final energy consumption (the core EU objective for RES is 32%)
- 38% qualitative energy efficiency improvement in final energy consumption (the core EU objective is 32,5%)

Year of objective: 2030	Real Data (2011)	NECP 2019	NECP 2023 (Preliminary	EU core objectives	Real data (2021)
----------------------------	---------------------	--------------	---------------------------	--------------------	---------------------

draft revised version)					
Reduction in greenhouse gas (GHG) emissions compared to 1990	-11.73% ¹	42%	54%	55%	25.48%
Reduction in greenhouse gas (GHG) emissions compared to 2005	15.04%	56%	N/A	22.7%	43.33%
Share of renewables in gross final energy consumption	12%	35%	44%	42.5%	39% ²
Energy efficiency improvements		xxx%	15.4%	11.7%	14.6%

The total estimated investments to achieve the objectives of the Plan will amount to EUR 43.8 billion for the period 2020 – 2030.

The total investments are distributed between:

- Electricity generation from RES: 21% (€9 bn)
- Electrical system infrastructure: 13% (€5.5 bn)

¹ https://ypen.gov.gr/wp-content/uploads/2023/05/2023_NIR_Greece.pdf

² according to the formula set out in Annex I of the Directive (EU) 2023/1791 on energy efficiency and amending Regulation (EU) 2023/955 ('EED recast')

- New thermal electricity generation plants and central storage plants: 3% (€1.3 bn)
- Works for the development of an electricity distribution network – Digitisation: 8% (€3.5 bn)
- Cross-border natural gas pipelines: 5% (€2.2 bn)
- Natural gas networks and storage: 5% (€2 bn)
- Research and innovation: 2% (€0.8 bn)
- Energy efficiency: 25% (€11 bn)
- Investments in the refinery sector: 3% (€1.5 bn)
- Climate change, flood management, forests: 5% (€2 bn)
- Circular economy, recycling: 11% (€5 bn)

The enhancements in attaining the data and the actions that complemented the achievement of the targets and objectives can be identified in the following steps.

Mitigation action	Measures	Reduction (Mt CO ₂ -eq)	
		2025	2030
Increased renewables in electricity generation	• Support innovative renewable energy projects • Guarantee of origin for renewable electricity • Develop licensing and planning framework for offshore wind farms • Develop legislative and regulatory framework for energy storage • Provide financial support for energy communities • Reform of the electricity market regulatory framework to	8.3	11.8

	promote the participation of decentralised energy schemes • Develop demand-side management programmes • Develop a licensing framework and technical specifications for renewable district heating, biogas injection into the gas network and geothermal		
Increased biofuels in transport	• Enhanced blending obligations with possible extension beyond road transport • Development of biofuels support schemes and special financing tools for advanced biofuels production • Pilot projects for gaseous fuels in the transport sector • Tax incentives for alternative fuels in transport	0.10	0.43
Energy efficiency in industry	• Financial and tax support for energy-saving technology investments • Financial support to energy efficiency programmes • Creation of industrial business zones • District heating at industrial business zones	0.76	1.28
Energy efficiency in buildings	• Establish a National Energy Efficiency Fund • Tax incentives for renewable heating and cooling • Energy saving contracting in the public sector	2.27	2.99

	• Financing programmes and tax incentives for renovation of public and private buildings • Improve regulatory framework and strengthen role of energy managers • Energy management systems in public buildings • Regulation promoting nearly-zero energy buildings • Financial programmes promoting energy efficiency agreements in the private sector • Expand gas network to reduce oil-fired heating		
Electrification and energy efficiency in road transport	• 10% share of electric vehicles (EVs) in passenger cars by 2030 • Deployed needed EV charging • Financial support of EV adoption • Sustainable urban mobility plans • Relocate commercial transport operations • Incentives for energy-efficient vehicles • Limiting import of older used cars • Maximum age for all vehicle types • Vehicle taxation promoting new and clean vehicles	0.05	0.19

Year of objective 2050:

- 85-95% in total gross greenhouse gas (GHG) emissions by 2050 compared to 1990.
- 60-70% in total gross greenhouse gas (GHG) emissions by 2050 compared to 2005.

- 81.9%–113.8% share of renewables in gross final energy consumption in 2050³
- 100% renewable electricity system

3.3 Alignment with Broader Policy Frameworks

In the collective pursuit of carbon neutrality by 2050, Greece and Spain have articulated distinctive strategies, each delineating comprehensive targets and objectives. A comparative analysis of their total GHG emissions, respective goals, particularly in relation to alignment with European Union (EU) benchmarks, reveals nuanced disparities in ambition and commitment.

YEAR	1990 (Baseline)	2005	2011*	2021
Energy (Greece)	77,133.43 7	107,379.67 (+39%)	92,161.13 (+19%)	53,598.90 (-31%)
Energy (Spain)	213,191.25	344,337.23 (+62%)	268,251.06 (+26%)	216,048.45 (+1%)
IPPU (Greece)	10,933.61	14,774.73 (+35%)	10,044.05 (-8%)	9,991.75 (-9%)
IPPU (Spain)	27,963.52	43,104.39 (+54%)	36,350.02 (+30%)	24,126.53 (-14%)

³ https://ec.europa.eu/clima/sites/lts/lts_gr_summary_en.pdf

Agriculture (Greece)	10,534.68	9,337.32 (-11%)	8,965.32 (-15%)	8,045.99 (-24%)
Agriculture (Spain)	33,022.58	35,896.95 (+9%)	32,688.33 (-1%)	34,369.39 (+4%)
Waste (Greece)	5,383.97	5,256.42 (-2%)	5,008.62 (-7%)	5,852.19 (+9%)
Waste (Spain)	13,532.92	15,421.06 (+14%)	17,342.74 (+28%)	14,303.44 (+6%)
Total (Greece)	103,985.69 1	136,748.14 (+32%)	116,179.12 (+12%)	77,488.83 (-25%)
Total (Spain)	287,710.27	438,759.63 (+53%)	354,632.15 (+23%)	288,847.82 (+0.5%)

Year of objective: 2030	Spain Target	Greece Target	EU core objectives
Reduction in greenhouse gas (GHG) emissions compared to 1990	23% ✗	54% ✓	55%
Share of renewables in gross final energy consumption	42% ✓	44% ✓	42,5%
Energy efficiency improvements	39.5% ✓ ✓	15.4% ✓	11.7%

In the context of Greenhouse Gas (GHG) Emissions Reductions, Greece aspires to effectuate a 42% reduction in GHG emissions relative to 1990 levels and a 56% reduction concerning 2005 levels by the year 2030. Conversely, Spain has set forth an objective of a 23% reduction in GHG emissions vis-à-vis 1990 levels within the same timeframe. The EU, through its directives, mandates a collective reduction of at least 40% below 1990 levels by 2030. Greece's emissions reduction targets, outpacing those of Spain, align more closely with the EU's overarching objective, exemplifying a heightened commitment to mitigating climate change.

In the realm of Renewable Energy, Greece aspires to secure a 35% share of renewables in gross final energy consumption by 2030, while Spain targets a 42% share of renewables in energy end-use within the same timeframe. Both countries transcend the EU core objective of achieving a 32% share of Renewable Energy Sources (RES) in the energy matrix by 2030. Greece's target, marginally below that of Spain, affirms both nations' dedication to spearheading sustainable energy initiatives.

Regarding Energy Efficiency, Greece envisions a 38% qualitative energy efficiency improvement in final energy consumption by 2030, whereas Spain aims for a 39.5% enhancement in energy efficiency within the same timeframe. Both countries establish targets surpassing the EU benchmark, underscoring their concerted efforts to augment energy efficiency within their respective domains.

In terms of Long-Term Goals (2050), Greece targets an 85-95% reduction in total gross GHG emissions from 1990 levels and a 60-70% reduction relative to 2005 levels. In comparison, Spain seeks climate neutrality through a 90% reduction in GHG emissions compared to 1990 levels. Both countries' long-term aspirations align with the overarching EU objective of achieving net-zero greenhouse gas emissions by 2050, signifying shared commitment to enduring sustainability objectives.

Greece and Spain, while converging in their commitment to carbon neutrality, exhibit nuanced distinctions in the ambit of their goals. Greece, with its marginally more ambitious targets, exemplifies an elevated commitment to environmental stewardship. Both nations substantiate their dedication to advancing the EU's broader sustainability imperatives and confronting the challenges of climate change.

Greece endeavors to enhance energy efficiency across all sectors, delineating a comprehensive array of measures within its National Energy and Climate Plan (NECP). While the energy efficiency obligation scheme yielded higher-than-anticipated savings from 2017 to 2020, Greece fell short of meeting its overarching energy-saving target during this period. Drawing insights from the experiences of fellow International Energy Agency (IEA) member nations, Greece stands poised to refine the scheme, thereby amplifying energy savings through 2030. The aging nature of the Greek building stock,

surpassing both the EU and IEA averages, represents a significant avenue for achieving energy savings. Existing measures for buildings encompass stringent building codes and a spectrum of incentives for thermal renovations, upgrading heating and cooling systems, and transitioning to more energy-efficient appliances. Additionally, the antiquity of the vehicle fleet on Greek roads, exceeding the EU norm, prompts interventions in the transport sector. Initiatives such as subsidies and fiscal measures are crafted to propel the adoption of electric vehicles (EVs), while local authorities are mandated to formulate plans promoting a modal shift towards public transit, cycling, and walking. In the industrial sector, energy demand audits constitute the primary measures, yet further endeavors are imperative to unlock the full potential of energy efficiency across all sectors, aligning with broader objectives related to energy security and climate.

The NECP underscores the escalating issue of energy poverty in Greece, designating its mitigation as a pivotal policy priority. The overarching goal is to diminish energy poverty by at least 50% by 2025, subsequently positioning it below the EU average by 2030. Alarming statistics from 2021 reveal that 17.5% of the total population and 36.7% of economically vulnerable consumers faced inadequate heating in their homes, surpassing the 8% EU average. In response, Greece released an Action Plan in September 2021, delineating a precise definition of energy poverty and formulating a comprehensive strategy reinforced by specific measures. The social tariff, instituted in 2010, emerges as the principal policy tool to address energy poverty, extending discounted electricity rates to various economically or socially vulnerable residential consumers. Notably, the government estimates that, in 2019, 500,000 to 550,000 households benefited from the social tariff.

Against the backdrop of a surge in global energy prices, particularly in Europe from late 2021, attributed to the geopolitical landscape following Russia's invasion of Ukraine, Greece implemented a series of measures to mitigate the impact on vulnerable consumers. These efforts involve expanding existing measures targeting energy poverty and introducing broader initiatives to alleviate energy prices for the majority of consumers. Between September 2021 and November 2022, Greece allocated EUR 9 billion to energy subsidies and ancillary measures through the Energy Transition Fund, established in 2021, with the aim of alleviating the burden of utility bills and combatting energy poverty amidst the challenging energy price dynamics.

Estimated investments by 2030	Spain Target	Greece Target
-------------------------------------	-----------------	------------------

Saving and efficiency	35% (€83.540 bn)	25% (€11 bn)
Renewable energy	38% (€91.765 bn)	21% (€9 bn)
Networks and electrification	24% (€58.579 bn)	13+3+8+5+5=34% (€5.5+1.3+3.5+2.2+2 = 14.5 bn)
Other measures	3% (€7.528 bn)	3+5+11=19% (€1.5+2+5=8.5 bn)

3.4 Target evaluation

3.4.1 Consistency

The evaluation of the carbon neutrality plans of Greece and Spain underscores distinctive approaches, yet both nations exhibit a consistent commitment to addressing climate change. Greece's targets, particularly in emissions reduction and renewable energy, demonstrate a high level of coherence within its plan, aligning closely with EU objectives. In contrast, while Spain's plan sets ambitious goals, a potential challenge arises concerning the disparity between its 2030 emissions reduction target and the EU's overarching target. The consistent alignment with broader global initiatives is crucial for the efficacy and success of these carbon neutrality endeavors.

3.4.2 Coherence of the plan

Greece's carbon neutrality plan manifests a robust and cohesive strategy. The multifaceted approach, incorporating ambitious emissions reduction, increased reliance on renewable energy, and energy efficiency improvements, reflects an integrated and coherent framework. The phased-out lignite production, as part of Greece's plan, is strategically aligned with environmental goals and demonstrates a systematic approach towards cleaner energy sources. In contrast, Spain's plan, while comprehensive, may benefit from a more explicit connection between its emissions reduction targets and the

specific measures outlined for achieving them. The cohesiveness of these plans is instrumental in ensuring effective implementation and monitoring.

3.4.3 Information

Both Greece and Spain provide extensive information within their respective plans, offering a transparent view of their intentions and strategies. Greece's plan incorporates specific details on lignite phase-out, investments, and mitigation actions, contributing to a comprehensive understanding of its carbon neutrality roadmap. Spain, while rich in data, could enhance its plan's clarity by providing more explicit information on how each mitigation action directly contributes to achieving its 2030 and 2050 targets. The transparency and accessibility of information are paramount for stakeholders, policymakers, and the public to comprehend, support, and participate in these ambitious sustainability initiatives.

In conclusion, the evaluation of the carbon neutrality plans of Greece and Spain reveals commendable consistency in commitment, with both nations showcasing coherent strategies. The information presented in these plans forms a critical foundation for understanding and participating in the collective effort towards a sustainable and carbon-neutral future.

4 Reviewing Regional Visions and Targets

4.1 Regional Visions and Targets

4.1.1 Region of Asturias

The energy transition process that Asturias is facing will be carried out with a long-term vision, looking towards 2050, taking into account the region's specific characteristics. To achieve this vision, a mid-term strategy is proposed, targeting 2030, called a Fair Energy Strategy based on two strategic objectives (SOs). These SOs are defined, in turn, based on four objectives (Os), two for each strategic objective, which will inspire the proposed measures to be implemented.

In its vision for 2050, Asturias will have a decarbonized, decentralized, digitized, and sustainable energy model, serving as a production facilitator for high competitiveness. It will be a diversified energy model, where relevant energy vectors will be electricity and renewable gases, capable of attracting investments and generating knowledge. This

model will be citizen-centered and have the capacity to create high-quality jobs. This model will be concretized based on the following principles:

Achieve a decarbonized energy sector.

Enhance the competitiveness of regional factors.

Place the consumer at the center of the model

And the following strategic lines of action are proposed to achieve them, also aimed at improving the utilization of the region's renewable energy resources and enhancing regional energy infrastructure.

-Identification of the regional potential for generation points and utilization of industrial heat.

-Promote the implementation of projects that leverage synergies between the energy and industrial sectors, enhancing the reuse of resources, efficiency practices, and/or circular economy.

-Promote the implementation of heat networks utilizing renewable energies or industrial heat.

-Advocate for favorable regulations to encourage demonstrative or pilot projects of energy transition technologies, technology hybridization, etc.

-Energy Efficiency Improvement and Renewable Integration Program in Industry.

-Promote pilot actions for industrial demand management regulation.

-Sector-specific information and training campaigns on new energy technologies
Regional Building Energy Rehabilitation Campaign.

-Encourage the development of energy improvement plans and Paces by local entities and their implementation.

-Encourage the purchase of renewable energy and energy-efficient public procurement by regional and local administrations, including carbon footprint in public procurement.

-Create a map of public facilities by sector and determine their energy improvement capacity. Facilitate collective energy improvement (energy efficiency and use of renewables) by subsectors, guild associations, location, etc.

-Promote the implementation of demonstrative projects for Smart Grids and Energy Communities Promote the utilization of natural renewable resources as a lever for activity in the primary sector and as carbon sinks.

-Promote pilot actions to boost local renewable energy generation, collective self-consumption, and sharing surpluses with vulnerable households Highlight the unique

aspects of the regional transition in Asturias (closure of mines, thermal plants, industrial decarbonization, logistics).

-Public awareness campaigns targeting citizens to promote measures such as collective self-consumption, local renewable energy generation, demand management, or sharing surpluses with vulnerable households.

4.1.2 Region of Western Macedonia

Western Macedonia has historically had the largest heating demand of any Greek region. The main development planning and programming documents of the Region, directly connected to financial sources for implementation are:

a) the Programme Western Macedonia 2021-2027, co-funded by the European Regional Development Fund and European Social Fund Plus+,

b) the Territorial Just Transition Plan Western Macedonia, co-funded by the Just Transition Fund. The development vision for the Region of Western Macedonia in the Programme Western Macedonia 2021-2027 is "The formation of a new, strengthened and distinct role of Western Macedonia in the national and international environment focusing on the creation of sustainable jobs through: the economic transformation of the regional economy in terms of improving competitiveness and extroversion, supporting clean energy and green sustainable development and integrated development of urban and rural areas, and the creation of a high level of social cohesion." The programme is articulated in six (6) Priorities and twenty-one (21) Specific Objectives of the new Cohesion Policy. The first priority "Strengthening the productive and economic transformation of the Region" will seek to cover needs in Strengthening public RTDI infrastructure, Interconnection of public RTDI structures and results with entrepreneurship, Strengthening business expenditure on RTDI, Creation of support mechanisms for innovative/start-ups and regional business ecosystem, Improving access to finance for businesses, Digital upgrading of public services, enhancing their accessibility to people with disabilities, and utilization of public data, Ensuring high quality broadband access speed in public services and businesses, Improving digital entrepreneurship, competitiveness and extroversion of businesses, Supporting diversification of businesses affected by lignite phase-out, Upgrading the skills of human resources of businesses to support innovation, extroversion and digital transformation. The second priority "Supporting clean energy and green sustainable development" addresses development needs in Promotion of energy efficiency to address climate conditions in a more economical and ecological way, Strengthening the prevention, response and management of floods, forest fires and other natural hazards, Expansion – upgrading of water supply infrastructure, wastewater management and support of water resources management actions by integrating modern practices and

technological tools, aiming at improving the condition of water resources water bodies and the achievement of the objectives of the Management Plan, Promotion of circular economy through integrated management and sorting at source of bio-waste (to be implemented by National Programs), Support mechanisms for the surveillance, management and protection of biodiversity and protected areas and their sustainable local development, Support interventions for the restoration and exploitation of the environment in urban centers and degraded areas and monitoring and recording air pollution and noise through and enhancing mobility options in major urban centres and promoting electromobility.

In accordance with the provisions outlined in the Operational Programme of the Western Macedonia Region, Priority P2 delineates specific objectives focused on advancing energy efficiency initiatives and curtailing greenhouse gas emissions. Furthermore, the Program emphasizes the implementation of energy-conserving measures within public infrastructure. The Operational Programme additionally underscores the imperative of promoting climate change adaptation and fortification against disaster risks through resilient measures, incorporating ecosystem-based approaches. A primary goal is the enhancement of capabilities in preventing, responding to, and managing natural hazards, coupled with the promotion of sustainable water management and access to water supply. The construction, upgrading, and judicious management of water supply infrastructure are integral components of the outlined objectives.

Moreover, the Operational Programme highlights the Region's commitment to fostering the transition toward a circular and resource-efficient economy. This involves initiatives targeting waste prevention, minimization, sorting, and recycling, alongside the establishment and administration of green points. Furthermore, the Region of Western Macedonia, in 2017, issued its "Action Plan for the Improvement of Energy Efficiency in Public Buildings," which encapsulates the energy efficiency targets for 2030 and 2050. Specifically, the Region aims to achieve a 40% reduction in greenhouse gas emissions by 2030, attain a minimum of 27% of the European Union's energy from renewable sources, enhance energy efficiency by 27-30%, and increase the interconnection of electricity by 15%. The latter entails ensuring that 15% of energy generated within the EU can be transported to other member countries. For the year 2050, the Region has set an ambitious objective of an 80-95% reduction in greenhouse gas emissions compared to 1990 levels. The Energy Roadmap 2050 outlines the strategic pathways to realizing this long-term target.

4.2 Comparison with EU Targets

The energy transition goals outlined by the Region of Asturias align closely with the broader European Union (EU) objectives for achieving a sustainable and decarbonized

future. The strategic vision for 2050, emphasizing a decarbonized and diversified energy model, resonates with the EU's commitment to achieving net-zero greenhouse gas emissions by 2050. The focus on electricity and renewable gases as significant energy vectors mirrors the EU's emphasis on renewable energy sources and the reduction of fossil fuel dependence.

The proposed strategic lines of action, such as the identification of regional potential for energy generation, promotion of industrial-energetic synergies, and the development of heat networks utilizing renewable energies, are in line with EU directives promoting energy efficiency and renewable energy integration.

The Region of Asturias' emphasis on citizen-centered models and the creation of high-quality jobs parallels the EU's ambition to ensure a just and inclusive transition, leaving no individual or region behind. Furthermore, the commitment to placing the consumer at the center of the model aligns with the EU's push for citizen involvement and empowerment in the transition towards sustainable energy.

The Region of Western Macedonia, as outlined in its Programme for 2021-2027, demonstrates a commitment to aligning its developmental vision with EU priorities. The focus on sustainable jobs, economic transformation, clean energy, and green sustainable development resonates with the EU's broader goals.

The priority areas outlined, such as strengthening the productive and economic transformation, supporting clean energy, and promoting sustainable development, align with EU priorities for economic resilience, green growth, and climate action. The specific objectives related to innovation, digital transformation, and business support echo EU strategies for fostering a competitive and sustainable economy.

The Region's commitment to advancing energy efficiency, promoting renewable energy, and addressing climate conditions aligns with the EU's directives on clean energy and climate resilience. The emphasis on circular economy practices, water resource management, and biodiversity protection corresponds to EU goals for environmental sustainability.

In summary, both Asturias and Western Macedonia demonstrate a commitment to aligning their regional visions and targets with overarching EU priorities, contributing to the collective effort towards a sustainable and resilient European future.

4.3 Comparison with National Targets

4.3.1 Asturias – Spain

The Integrated National Energy and Climate Plan (PNIEC-NECP) 2021-2030 is the reference document for the national energy transition, outlining sector-specific goals for reducing greenhouse gas emissions, increasing renewable energy penetration, and improving energy efficiency. It also includes the policies and measures to achieve these objectives. The main goals set by the NECP for 2030 are:

- 23% reduction in greenhouse gas emissions compared to 1990,
- 42% of renewables on the final use of energy,
- 39.5% improvement in energy efficiency,
- 74% renewable energy in electricity generation.

On the other hand, the Just Transition Strategy is an action guide to optimize the benefits and minimize the risks of the energy transition on vulnerable groups and geographical areas. The strategy focuses mainly on elements related to supporting the transformation of economic sectors and generating and protecting employment. It aims to anticipate and mitigate, with solidarity criteria, the consequences for regions and individuals directly linked to technologies that will be progressively displaced due to the transition driven by the NECP. The Asturias Energy & Just Transition Strategy goals (aligned to the TJTP) are:

- 26% reduction in primary energy consumption. (28,5%, 2025)
- 72% renewable energy in electricity generation, (55%, 2025)
- 9,1 % of savings in the final use of energy, compared to 2017
- 12,6% of renewables on the final use of energy, (11,6%, 2025)

In this European and national context, Asturias is confronted with the imperative need to transition its coal-based energy sector. Due to the implementation of European Union market instruments, coal-fired power plants will cease to contribute energy to the system, at the latest by 2030. This is because they will face significant challenges in remaining competitive against other technologies in an environment heavily influenced by the European response to climate change. In this scenario, the cost of CO₂ is expected to rise steadily, while the costs of renewable technologies become increasingly competitive.

In its vision for 2050, Asturias will have a decarbonized, decentralized, digitized, and sustainable energy model, serving as a facilitator of high competitiveness. It will be a

diversified energy model where electricity and renewable gases are the relevant energy vectors. This model will be capable of attracting investments, generating knowledge, focusing on citizens, and having the capacity to create high-quality jobs.

The Strategy aims to actively involve citizens in the energy transition, with specific measures to encourage their engagement. This shift towards a decarbonized energy system is not only a significant technological and social challenge but also an opportunity to give citizens a central role in energy matters, following the "Clean Energy for All Europeans" package. In addition to the planned measures, citizen participation in the governance of the Strategy is encouraged, with a communication channel in the Regional Just Transition Observatory to subject proposals to public consultation and allow citizen participation in their definition.

The role of the Regional Just Transition Observatory will be to assess the implementation of the measures in the Energy Transition Strategy, incorporating the participation of citizens and social organizations, and ensuring maximum transparency in the process. While it will also evaluate other regional strategies, such as raw materials and energy-efficient building rehabilitation in Asturias, the Asturian Energy Foundation will manage specific actions of the Observatory related to the Energy Transition Strategy.

Tracking the implementation of measures and the degree of execution of the Strategy.

- Tracking the implementation of measures and the degree of execution of the Strategy.
- Verification of achieved savings, emissions reduction, contribution of renewable energy, and other monitoring indicators defined by the implementation of measures.
- Preparation of annual reports on the results achieved with the implementation of measures.
- Evaluation of the degree of deviation from the set objectives.
- Preparation of technical reports for the regional administration.
- Permanent communication channel with members of the working groups for specific actions and activities.
- Dissemination of news related to the implementation of measures outlined in the Strategy, as well as the publication of information with key data.

Communication with citizens so that they can contribute to the definition of the Strategy and its measures

4.4 Evaluating the Progress of the Objectives and Targets – Evaluating Regional Plans

The assessment of existing regional plans in the Region of Asturias and the Region of Western Macedonia reveals notable achievements and areas for potential enhancement.

In the Region of Asturias, the overarching vision for 2050 is a notable success, aligning with the broader EU agenda for a sustainable and decarbonized future. The emphasis on a diversified and citizen-centered energy model is commendable, reflecting a commitment to inclusive and forward-thinking strategies.

However, there exists room for improvement in the specificity of targets. A more explicit articulation of measurable objectives and a refined implementation framework would enhance the precision and efficacy of the plan. Despite this, the strategic lines of action, especially those focusing on renewable energy and industrial-energetic synergies, underscore a comprehensive approach to achieving energy policy objectives.

Additionally, the Fair Energy Strategy exemplifies the application of Energy Efficiency First (EE1st) through its emphasis on energy-efficient technologies and the identification of potential generation points. This underscores the pivotal role of energy efficiency in achieving a sustainable energy transition.

The Region of Western Macedonia demonstrates a robust commitment to aligning its developmental vision with EU priorities. The development plan's emphasis on sustainable jobs, economic transformation, and clean energy is commendable, laying a solid foundation for regional energy policies.

While the priorities outlined in the Operational Programme are aligned with EU directives, there is a need for more quantifiable targets. Enhancing the specificity of objectives would facilitate a more accurate assessment of progress over time. Additionally, providing more detailed strategies for promoting circular economy practices within the energy sector could enhance the plan's environmental sustainability.

In addition, the application of EE1st is evident in the Operational Programme's priorities. The focus on energy efficiency initiatives and greenhouse gas emission reductions aligns with the EE1st principle. Specifically, the plan emphasizes efficiency measures in public infrastructure, showcasing a commitment to optimizing energy use before considering alternative sources.

4.5 Identifying Synergies and Gaps

In examining the regional energy objectives of the Region of Asturias and the Region of Western Macedonia, it is imperative to conduct a comprehensive analysis of the feasibility of achieving these objectives over time and the potential challenges that may arise.

4.5.1 Region of Asturias

The commitment of Asturias to achieve climate neutrality by 2050 aligns seamlessly with broader national and EU objectives, fostering synergies in addressing climate change at both regional and supranational levels. This alignment positions Asturias as an integral contributor to the collective efforts in mitigating climate impacts. Additionally, the proposed energy model, emphasizing decentralization, digitization, and sustainability, resonates with overarching goals of digital transformation and decentralization within national and EU energy policies. The citizen-centered model with a focus on high-quality job creation embodies a synergistic approach to regional development and sustainability.

However, challenges arise in the absence of explicitly defined and measurable targets within the regional plan. The lack of a detailed implementation framework further introduces uncertainties in executing proposed strategies, potentially hindering efficient progress toward outlined objectives. The closure of mines and thermal plants poses a potential gap in the just transition process, necessitating comprehensive strategies for retraining and reemployment in affected sectors. Addressing these transition challenges is imperative for the successful realization of Asturias' energy objectives.

4.5.2 Region of Western Macedonia

The emphasis on clean energy and green sustainable development in Western Macedonia aligns with national and EU priorities, contributing to the broader goal of transitioning to a low-carbon economy. This regional commitment not only fosters environmental sustainability but also positions Western Macedonia as a key player in the larger context of European energy transformation. Furthermore, the region's focus on climate change adaptation fosters synergies with national and EU efforts, enhancing regional resilience against environmental challenges. The alignment of regional priorities with broader European objectives signifies a collective effort towards climate resilience and sustainable development.

Similar to Asturias, the need for more specific and quantifiable targets within the operational program is identified in Western Macedonia. The establishment of clear,

measurable objectives is crucial for tracking progress and ensuring accountability in achieving sustainable energy goals. More detailed strategies regarding circular economy practices, waste management, and recycling within the energy sector could enhance the plan's environmental sustainability. The region may also face challenges in securing adequate funding for the transition, requiring synergies with national and EU funding mechanisms to address potential financial gaps. Addressing these gaps and fostering continuous collaboration with national and EU frameworks is crucial for sustainable and successful energy transitions in Western Macedonia.

5 Setting New Regional Objectives and Targets – Implementation of the stakeholder

Once, the national and regional instruments have been analysed and compared to the EU vision and goals, the need of re-defining or adjusting the regional objectives, priorities and targets may appear; to include aspects like economic development, long-term energy independence, environmental protection, improvement of quality of life and of health, as well as the definition of proper indicators to better define the new set of objectives. To do this, a participatory dialogue should be open to key stakeholders.

5.1 Discussion with stakeholder – Establishing Priorities

Once national, regional, and local visions, targets, strategies, and plans have been reviewed, planners should engage with stakeholders to discuss these and their implication on the regional energy plan. The dialogue should aim to:

- Identify **potential barriers and opportunities** for achieving established goals in order to consider them further in the regional plan.
- Ensure that **regional needs and stakeholder concerns** are adequately reflected in the regional plan and sufficiently considered in new/revised objectives and targets.
- **Build consensus** on the regional energy vision, objectives, and targets.
- **Rank the importance** of objectives to build consensus on priorities.

Stakeholder engagement may take the form of workshops, meetings, or online consultations, depending on the resources available and the preferences of the stakeholders involved.

To facilitate the stakeholder involvement and discussions but also to better and easily establish priorities and build consensus, a “**Participatory Priorities Ranking Tool**” has been released. <[Download](#)>

This tool can facilitate planners rank priorities using a collaborative process. It provides a systematic approach for gathering inputs and perspectives from a diverse group of stakeholders, such as community members, experts, or decision-makers, and collectively determining the relative importance and urgency of different options and measures. By actively involving stakeholders, a more inclusive and representative

prioritization process is ensured, ultimately leading to more effective and sustainable outcomes.

The Participatory Priorities Ranking (PPR) tool is a structured tool designed to support regional authorities define their priorities in energy and climate policy, through a participatory approach by engaging stakeholders in the decision-making process.

It offers a transparent framework that guides users through the process of selecting, evaluating and ranking priorities. This structured approach encourages open communication, fosters a sense of ownership and buy-in from all stakeholders, and promotes a shared understanding of regional planning.

Through their active involvement, stakeholders can collaboratively weigh the significance of each priority, considering various factors such as EU & National policies, social acceptance and other regional strategies. By enabling the consideration of diverse perspectives and expertise, the tool ensures a robust evaluation and ranking of priorities, leading to informed and well-balanced decisions that address the collective needs and aspirations of stakeholders.

As a result, the final ranking of priorities is not only comprehensive and accurate but also enjoys broad-based support, enhancing the likelihood of successfully implementing the respective actions that emerge. This participatory approach fosters a culture of collaboration, cooperation, and shared responsibility, which is vital for addressing complex challenges, such as climate change, and achieving long-term positive impacts.

The tool includes a guiding document showing how to use it.

5.2 Defining New or Revised Objectives

After analysing the exiting national and regional instruments, some adjustment to the existing regional planes could be identified, in this case, a policy review proposition o policy recommendation could be proposed. During the revision of regional planes some items should be taken into account:

- Global and specific objectives and targets are measurables by means of well-defined indicators. These indicators could be easily calculated and estimated and the raw data or information to do it is open, available, and properly updated.
- The general objectives should be well distributed by sectors, industry, residential, primary sector, transport.
- A proper and consistent list of measures and actions should be proposed, well aligned and oriented to the consecution of objectives. Each action should contain its specific impact and contribution to the overall objective. Also, how much budget is compromised to the programme, action or set of actions.

- Others,

5.2.1 Consideration of Factors

During the process of revising, updating and settings new objectives and targets of the regional energy strategy and planes, it should be taken into account another related factors and variables close or related to the energy field, such us, economic development, energy independence, environmental protection, quality of life, and health, at the end, the three-pillar building the sustainable development of the region, the economy, environment and social aspects (health, security, wellbeing). To do this, it will be needed to take a look to another policy instruments in the regions in topics such as: climate change and adaptation, environmental protection (water and air), biodiversity and soil, or social topics like, housing, poverty and health.

Once we identify specific Programmes and actions plans, we should try to define synergies, i.e:

- From housing plans: building renovations,
- From climate adaptation plans: heat waves measures, forest protections and biomass.
- From health plans: indoor comfort conditions, air quality and moisture.

Thus, some important synergies should be taken in mind, in order to define new multigovernmental and transversal measures, including the integration or specific action plans, like the integrated energy and climate planes.

All these findings and new proposals of objectives and targets should be properly documented by a policy review proposition o policy recommendation draft document. These draft documents should be circulated and shared to the stakeholder group and re-initiate a new dialogue.

5.3 Review the New Regional Objectives and Targets

Once, the new objectives and targets, proposed measures and integrated actions has been identified and properly documented, by a convenience set of policy review propositions o policy recommendation draft documents, a new revision should be conducted by the stakeholder group to validate and/or propose new ideas or material before passing to the policy makers.

6 Conclusion

The training outlined in this document provides a structured approach to understanding and implementing the Energy Efficiency First (EE1st) principle in regional planning. By exploring data collection methods, energy inventory development, and practical case studies, participants gain valuable insights into optimizing regional energy systems. The methodologies and tools presented offer a solid foundation for data-driven decision-making, helping regions improve energy efficiency and sustainability. By applying these strategies, regional authorities and stakeholders can develop more effective energy plans, ensuring a more sustainable and energy-efficient future.



Website:

<https://regio1st-planning-framework.fedarene.org/>

Social Media:



Co-funded by the European Union under project n°101076088. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.