REGI1ST

Implementing the Energy Efficiency First Principle in Regional Planning

POLICY BRIEF

October 2025

In a nutshell

In Croatia, regional (and local) authorities play a key role in contributing to national reporting on energy efficiency and renewable energy progress. The regions obligations stem primarily from the Energy Efficiency Act and the Regulation on the System for Monitoring, Measurement and Verification of Energy Savings, which establish a structured system for planning, implementing and reporting measures at the subnational level.

Each county and major city must prepare a three-year Energy Efficiency Action Plan, outlining measures to improve efficiency across key sectors such as buildings, transport and public lighting. They are also required to submit annual implementation reports to the responsible Ministry through the national digital platform SMIV and by providing a written report. These reports include data on implemented measures, achieved energy savings, investment costs, emissions reductions and responsible authorities.

The Ministry, through the National Coordination Body for Energy Efficiency, collects and verifies the data submitted by regional authorities. This information is aggregated and integrated into national policy frameworks such as the National Energy Efficiency Action Plan and the Integrated National Energy and Climate Plan (NECP 2021–2030). It also forms part of Croatia's official reporting to the European Commission under the Energy Efficiency and Renewable Energy Directives.

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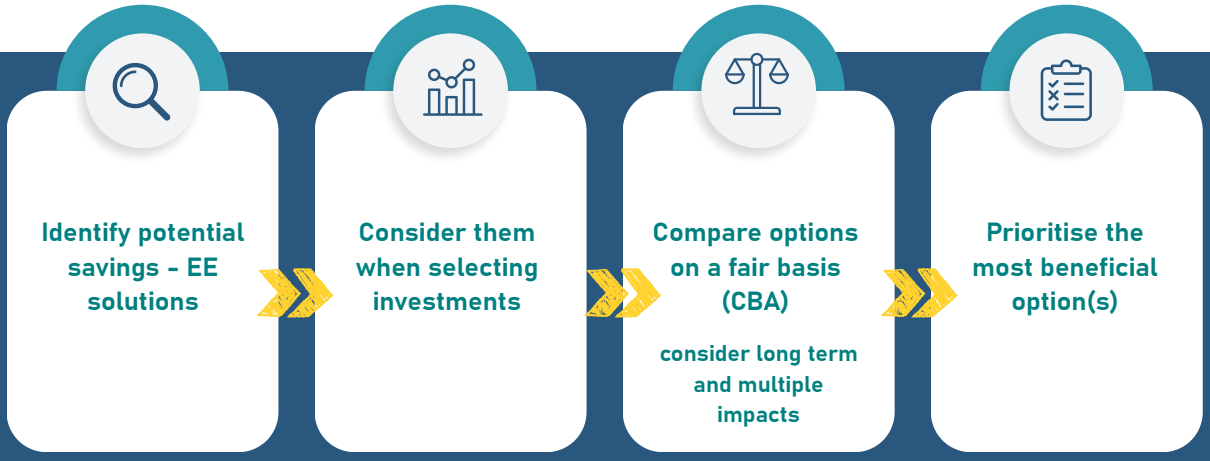
Regional data provide the foundation for assessing national progress towards energy-saving targets, renewable energy shares and decarbonisation objectives. This bottom-up reporting process ensures that regional achievements and challenges are reflected in Croatia's national reporting and policy development, strengthening coherence between local/regional implementation and national and EU energy and climate goals.

Regio1st regional workshops demonstrated a clear evolution in awareness, understanding and engagement among local and regional stakeholders. Initially, participants had limited familiarity with the EE1st principle, often recognising its individual components (such as prioritising efficiency or cost-effectiveness) without connecting them to the broader EU concept. Through hands-on sessions and practical demonstrations using the Regio1st tools, participants developed a clearer understanding of the principle's relevance and application in regional planning.

The basics

Energy Efficiency First Principle[1]: Prioritise energy demand reduction through cost-efficient energy efficiency measures in energy planning, policy and investment decisions. In practice, the EE1st principle balances demand and supply options to prioritise the most beneficial energy investments for the concerned community.

This is done by means of cost-effective end-use energy savings, demand response initiatives and more efficient energy supply.



The CBA does not make the decision, it helps in making it, depending on priorities.

[1] Defined in 2018's Governance Regulation, reinforced in 2023's recast

EU context and policies

The European EE1st context and implementation is mainly set in the recast Energy Efficiency Directive[2], in particular:

- **Article 3 defines EE1st and sets the general frame** and highlights that the principle should be applied wherever it is relevant, including in regional plans;
- **Article 25 requires regional and local authorities to prepare local heating and cooling plans** in municipalities with 50 000+ inhabitants

In the perspective of EU-wide infrastructure development, **TEN-E[3] also requires cost-benefit analysis to integrate EE1st principle** in the planning of regional electricity, gas (incl. hydrogen) and district heating networks.

Croatian context

Regulatory framework

When preparing regional energy plans in Croatia, it is essential to align them with the national legal and strategic framework governing energy efficiency, renewable energy and climate policy.

1. Key Legislation

Energy Efficiency Act (OG 127/2014, 116/2018, 25/2020, 32/2021, 41/2021, 40/2025) . Establishes the framework for efficient energy use at national, regional and local levels. It mandates the adoption of Energy Efficiency Action Plans, defines responsibilities of energy authorities, distributors, and suppliers, and sets procedures for monitoring and verifying energy savings.

According to the proposal for the new Energy Efficiency Act (pending adoption), for the first time, the legislation introduces the mandatory application of the EE1st principle in the development of policies, in strategic planning and development management, in the preparation of energy efficiency plans at the national, regional and local levels, as well as in decision-making on investments in strategic and large investment projects whose value exceeds 100 million euros. The application of the EE1st principle may also include conducting a cost-benefit analysis that, in addition to economic criteria, takes into account broader social criteria such as combating poverty and protecting the environment. Furthermore, this proposed Act prescribes the application of the EE1st principle in the conclusion of public procurement contracts and concession agreements.

[2] Directive (EU) 2023/1791 on Energy Efficiency
[3] Directive 2022/869 on guidelines for trans-European energy infrastructure (TEN-E)

Renewable Energy Sources and High-Efficiency Cogeneration Act (OG 138/2021, 83/2023, 78/2025) – Regulates the promotion and sustainable use of renewable energy and cogeneration of heat and electricity. It defines mechanisms for incentives, self-supply, and integration of renewable sources into the energy market, supporting Croatia's and the EU's decarbonisation goals.

Ordinance on the System for Monitoring, Measurement and Verification of Energy Savings (SMIV) (OG 98/2021, 30/2022, 96/2023) – Establishes the methodology and procedures for calculating, verifying, and reporting energy savings. It provides a unified national framework for monitoring the effectiveness of energy efficiency measures and reporting at all levels of governance.

2. National Strategies and Plans

Integrated National Energy and Climate Plan (NECP) 2021–2030 – Defines Croatia's energy and climate targets and measures across five dimensions of the Energy Union: energy security, internal energy market, energy efficiency, decarbonisation, and research and innovation. Regional and local plans should contribute to the achievement of these national targets;

Energy Development Strategy of the Republic of Croatia until 2030 with a view to 2050 – Outlines the strategic vision for a secure, competitive and low-carbon energy system, promoting energy transition, sustainability and economic efficiency;

National Energy Efficiency Action Plan – A triannual plan prepared by the Ministry of Economy and adopted by the Government. It sets national energy-saving targets, defines measures for improving energy efficiency and allocates institutional responsibilities for implementation and monitoring.

Regional energy planning process

Regional energy planning in Croatia is a part of the multilevel governance structure: national, regional (counties) and local (cities/municipalities). Regional plans must align with national laws, strategic plans, and EU obligations, but also respond to local/regional context (data, resources, capacity, energy demand, renewable potential etc.).

Medjimurje County, as the county/regional authority of the Medjimurje region located in the northern part of Croatia, has an active role in energy planning at the regional level. Mandated by the Croatian Energy Efficiency Act, the region is obligated to adopt **three-year energy efficiency action plans (EEAPs)** for its territory, implement energy efficiency actions, monitor the effects of these actions and report on implemented actions annually to the national coordinating body for energy efficiency.

Regional energy planning process can be summarised as following:

1. Analysis of the legislative context
2. Data collection and baseline consumption analysis
3. Definition of goals and design of measures
4. Finalisation of the plan – approval – implementation

How to embed EE1st in regional governance structure and decisions

A total of five workshops for regional stakeholders were organised between April 2023 and April 2025, with the focus on highlighting the importance of applying the EE1st principle in regional planning and on facilitating its implementation through the use of the Regio1st Planning Framework and its tools.

The workshops revealed that, while stakeholders were familiar with key regional plans or strategies (e.g., the County Development Plan, Energy Efficiency Action Plan), awareness of the EE1st principle was limited, and integration into decision-making remains partial. Main barriers included financial constraints, limited political will and gaps in knowledge about EE1st.

Through interactive sessions, stakeholders tested various planning tools, including stakeholder mapping, targets comparison, priority ranking, energy inventory, (Social) Cost-Benefit Analysis ((S)CBA) and monitoring templates. Participants found these tools highly useful for structuring energy planning, prioritising actions and monitoring impacts, although some tools (e.g., (S)CBA, energy inventory) were recognised as data-intensive and requiring expert support. In particular, the monitoring template was highlighted as a simple, adaptable tool for tracking energy savings, CO_2 reductions and measure effectiveness.

Lessons Learned

Key lessons that can be reproduced in other regions include:

- importance of awareness-raising and capacity-building;
- hands-on tool-based engagement;
- structured stakeholder involvement;
- use of practical monitoring frameworks to evaluate and report on progress.

These approaches enhance regional planning effectiveness and can support broader adoption of energy efficiency and climate measures across Croatia.

Available support for regions – Policies, Funding and more

Croatia provides a broad and coordinated framework of national policies and funding opportunities that support energy efficiency improvements across all regions, offering regional and local authorities multiple entry points for participation. These opportunities stem from **national legislation, EU structural and investment funds**, and **domestic financial mechanisms** designed to promote a cost-effective and just energy transition.

At the national level, energy efficiency is governed primarily by the **Energy Efficiency Act** and accompanying programmes such as the **Long-Term Renovation Strategy for Buildings.** These set out obligations, targets and measures applicable throughout the country. For regional authorities, these frameworks serve as the foundation for developing and implementing energy efficiency plans, public building retrofits and integrated low-carbon strategies.

Several major funding instruments are accessible to regions. **The Environmental Protection and Energy Efficiency Fund** regularly launches national calls that are open to municipalities and counties, for example. Through these calls, public bodies can obtain co-financing for the energy renovation of public buildings and implementation of energy-saving measures in schools, hospitals or administrative facilities. The Fund also manages national programmes supporting the deployment of renewable energy systems, which are relevant to regional development strategies.

Croatia also benefits from significant EU co-financed programmes, including the **Operational Programme Competitiveness and Cohesion** (2021–2027) and the **Modernisation Fund**, which target energy efficiency, renewable energy integration and decarbonisation projects across the public and private sectors. Regional authorities can apply for funding to upgrade public infrastructure, improve energy performance of buildings or introduce sustainable mobility solutions. In addition, the **National Recovery and Resilience Plan** dedicates funding to deep renovation projects in residential and public buildings, and to the promotion of green transition measures; resources which are distributed nationally but implemented locally through regional coordination.

Financial support is complemented by technical assistance and capacity-building measures. Regional and local authorities can benefit from advisory support provided by national/regional energy agencies and programmes promoting one-stop shops for building renovation. These initiatives aim to strengthen regional capacities to design, apply for, and implement energy efficiency projects effectively.

Overall, Croatia's system ensures that energy efficiency funding is accessible to all regions, regardless of their administrative capacity or economic strength. National calls are typically open to applicants from any county, enabling balanced territorial development. By aligning national and EU resources, Croatia provides regional authorities with multiple tools to pursue energy-efficient, low-carbon, and climate-resilient development pathways.

What does EE1st change in the process and discussions?

The Regio1st Planning Framework serves as both a methodological and practical foundation for introducing and operationalising the EE1st principle in regional energy planning. Its tools, templates and guidance materials were applied throughout the regional workshops organised in the region of Medjimurje, offering local and regional stakeholders a structured approach to integrating EE1st into decision-making processes.

While participants generally recognised the value of the framework, its uptake was influenced by varying levels of technical capacity and institutional readiness. Simpler tools, such as the Monitoring Template and the Multi-Criteria Decision Analysis (MCDA), were found to be immediately applicable and user-friendly. However, more complex instruments, such as the Energy Inventory Data Collection Template and the Social Cost-Benefit Analysis (SCBA) tool, required technical expertise and time commitments that exceeded the internal capacities of most regional authorities.

Despite these challenges, participants acknowledged that the framework provides an effective structure for aligning regional energy plans with EU energy efficiency principles.
While Croatian legislation formally acknowledges EE1st, its practical application at the regional level has remained limited. The Regio1st process helped to fill this gap by translating the principle into actionable steps and decision-support tools.

During the implementation phase of the Regio1st project, Medjimurje County has adopted its Energy Efficiency Action Plan for the period 2025-2027, in late 2024. The plan positions EE1st as a central element of regional energy planning, emphasising that energy efficiency measures should be prioritised over supply-side solutions whenever technically feasible and economically justified. The principle is embedded not only in the strategic objectives of the plan but also in practical implementation mechanisms, including cost-effectiveness assessments for project evaluation and prioritisation of efficiency measures in investment planning.

Another regional plan for Medjimurje County was developed during the implementation phase of the Regio1st project – Energy and Climate Action Plan (part of another LIFE project – CEESEU-DIGIT). The EE1st principle, as well as the available Regio1st tools, were used and taken into account when defining the measures in this plan wherever applicable, to the greatest extent possible

What can EE1st change in the analysis / assessment: example of social CBA

Two different types of CBA can be conducted, namely:

Original CBA:

A cost-benefit analysis (CBA) is conducted to measure the benefits of a decision or taking action minus the costs associated with taking that action. CBA includes measurable financial metrics such as revenue or costs due to the decision to pursue a project. In this research, the term economically feasible or not feasible are also used to explain the results of the CBA analysis. The economic impacts are identified, and the evaluation is performed taking into consideration the impacts on the national economy. The analysis is based on changes in the market prices.

Social CBA:

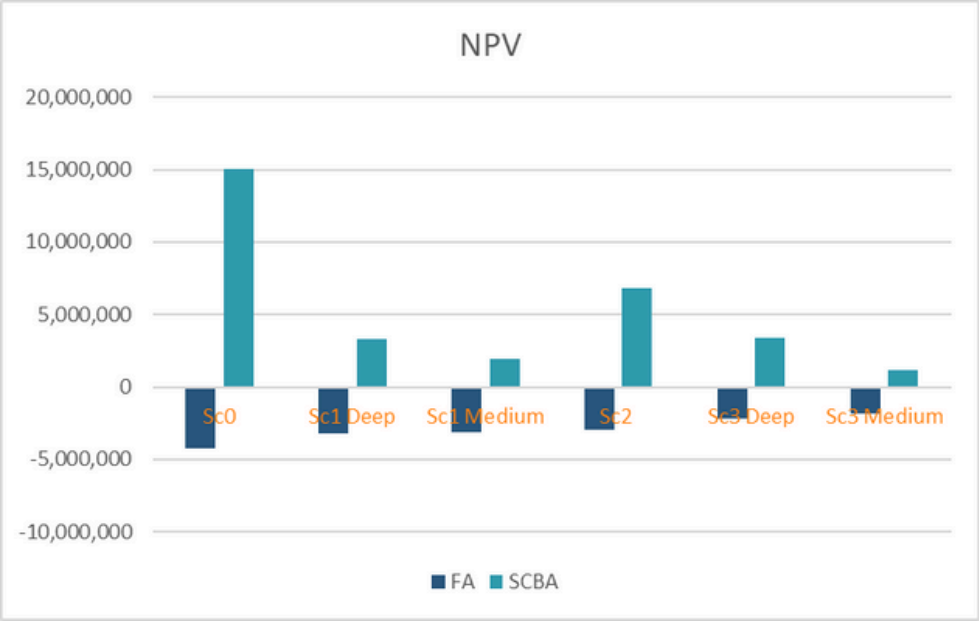
SCBA includes all the factors of CBA analysis. In addition to this, the environmental and social impacts are identified, and the evaluation is performed taking into consideration the impacts on the whole society. The analysis includes both the market prices and the external cost and benefits triggered by the examined investments.

The CBA aims to examine the social profitability of the examined energy efficiency projects, justifying the potential utilization of specific financial schemes (such as subsidies) in relation with the results of the financial analysis. The conduction of the financial analysis and the social CBA leads to the calculation of two different indicators, namely the financial Net Present Value (NPV) (or the financial Internal Rate of Return (IRR)) and the social NPV (or the social IRR respectively). Another considered metric is the Benefit-to-Cost Ratio (B/C Ratio).

Table 1: The results of financial and social NPVs and the decisions to move forward/to stop.

Potential result of calculations	Financial NPV	Social NPV	Conclusions	Next steps
1st	≥ 0	≥ 0	Economically and socially beneficial	Promoting these types of investments/ interventions
2nd	≤ 0	≥ 0	Economically not beneficial. However, socially important	Providing financial supports, e.g., subsidies, increasing municipality's equity share in the investment
3rd	≥ 0	≤ 0	Economically beneficial to invest on a project but not socially.	Penalty for the investors and imposing the incentives that distribute the economic benefits among different groups, such as taxes.
4th	≤ 0	≤ 0	Economically and socially not beneficial.	Stop the investments/interventions

Figure 1: Overview of B/C ratios per scenario in Medjimurje.



In Medjimurje, the baseline scenario, in which is assumed the installation of efficient gas boilers (or other types of fossil fuel boilers), without any building upgrade, yielded the best results. This outcome is due to the high externality value of biomass, which was assumed to have higher societal harms, following data found in the literature quantifying the societal harm in EUR/kWh.

Gas boilers are considered more efficient and less harmful compared to biomass systems. It is important to understand that Međimurje is a predominantly rural region with a few small hills, well connected to the gas network, yet still partly reliant on wood heating (which is classified as biomass). The combustion of such fuels (wood) results in very low efficiency and higher emissions.

Energy prices and consumption levels have the greatest impact on overall outcomes, with more extensive renovation leading to greater savings. Since electricity is significantly more expensive than gas and biomass, high electricity consumption is not economically viable. Biomass appliances have low efficiency and considerable negative externalities, so phasing them out improves overall results. Solutions with lower upfront investment provide faster payback and allow a larger number of households to benefit.

This is a good example presenting a situation where idealistic proposals (including renewables necessitating high connectivity and large upfront costs) clash with the sociotechnical realities of the region. Lastly, the budget considered for the calculations and the application of the tool was rather low, which highly limits the long-term effects of more costly policy measures, as the outreach becomes minimal.

What's next?

The EE1st principle calls for energy-saving solutions to be systematically considered before making investments in supply, infrastructure or technology. While Croatia has made progress in integrating EE1st into national (and somewhat) regional planning, further alignment is needed to ensure that energy efficiency truly guides all stages of policy design and investment.

To achieve this, public authorities at all levels - national, regional and local - should adopt more structured approaches to applying EE1st. This includes clearer guidance, capacity building and better coordination across sectors that influence energy use, such as spatial planning, transport, housing and economic development.

To strengthen the application of the EE1st principle, Croatia can focus on improving policy coherence, institutional support and practical implementation:

- Policy Integration: Embed EE1st into national and regional strategies, including energy, climate, spatial and development plans, ensuring consistent objectives and interdepartmental coordination.

- Legal and Institutional Support: Clarify legal obligations, standardise procedures for energy efficiency assessments and create coordination mechanisms across ministries and regional authorities.

- Financial and Technical Assistance: Provide targeted funding, incentives and technical support through helpdesks or regional energy agencies to enable regions/municipalities to prioritise energy efficiency.

- Capacity Building and Awareness: Train officials, share good practices and engage the public to foster understanding of EE1st's benefits and promote its adoption in regional decision-making.

- Data and Evidence-Based Decisions: Improve collection, transparency and use of energy data to support informed policy and investment choices.

By implementing these measures, Croatia can make energy efficiency a practical priority in planning, investments and regional development, achieving both environmental and economic benefits.

REGIO1ST

Regio1st raises awareness about the Energy Efficiency First principle (EE1st) among regional governments and their agencies and supports them to make related decisions in their planning.

Scan here to visit our Planning Framework:

www.fedarene.org/project/regio1st

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