Final report

Evaluation of programmes financed under the European Economic Area (EEA) and Norwegian Financial Mechanisms for the period 2014–2021

Evaluation of the Programme "Energy and Climate Change"

June 2025

Iceland Liechtenstein Norway grants

REPUBLIKA HRVATSKA
Ministarstvo regionalnoga razvoja i fondova Europske unije

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Final report

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The undersigned hereby confirm that the information presented in this report is accurate and reflects the findings and conclusions of the authors.

PROJECT SHEET

Report	Final report
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Name of the project	Evaluation of programmes financed under the European Economic Area (EEA) and Norwegian Financial Mechanisms for the period 2014-2021
Evaluated Programme	Energy and Climate Change
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Acronyms

EEA: European Economic Area

EED: Energy Efficiency Directive

EPC: Energy Performance Certificate

EPBD: Energy Performance of Buildings Directive

EPEEF: Environmental Protection and Energy Efficiency Fund

ERDF: European Regional Development Fund

EU: European Union

EQ: Evaluation question

FMC: Financial Mechanism Committee

JTF: Just Transition Fund

HEP: Croatian Electricity Utility

MF: Modernization Fund

NFP: National Focal Point

NVE: Norwegian Water Resources and Energy Directorate

nZEB: Nearly Zero Energy Building

OTSC: On-the-spot control

PO: Programme Operator

PP: Programme Promoter

PPA: Programme Partner

PV: Photovoltaic

REA North: project One Sun Connecting North and South led by the Regional Energy Agency North

RED III: Renewable Energy Directive

RES: Renewable Energy Sources

ToR: Terms of Reference

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Executive summary

The 'Energy and Climate Change' programme, with a total budget of EUR 20 million (EUR 17 million from the European Economic Area (EEA) grants and EUR 3 million from national co-financing) aimed to support clean energy transition in Croatia. It fully aligned with key national strategic documents such as the *Energy Development Strategy* and the *Integrated National Energy and Climate Plan*, as well as with key EU initiatives, such as the European Green Deal, REPowerEU Plan, and directives such as the Energy Efficiency Directive (EED)[1], Renewable Energy Directive III (RED III)[2], and the Energy Performance of Buildings Directive (EPBD)[3].

The Ministry of Regional Development and EU Funds (MRDEUF), as the Programme Operator supported by the Energy Institute Hrvoje Požar (EIHP) as the Programme Partner and the Norwegian Water Resources and Energy Directorate (NVE) as the Donor Programme Partner effectively coordinated the programme. Human and financial resources (EUR 1.11 million allocated to programme management) were used efficiently.

The objectives of the programme were achieved through two outcomes: 1. Improved energy efficiency and 2. Increased renewable energy production. Under Outcome 1, the National Training Centre for Nearly Zero Energy Buildings (nZEB) at the EIHP was established and a deep renovation of the EIHP office building to nZEB standards, including the replacement of the heating, ventilation, and air conditioning (HVAC) system, lighting, and building automation systems, as well as the installation of a photovoltaic system was performed. Outcome 2 was facilitated through four open calls for proposals (solar, geothermal and sea energy utilisation projects, and projects addressing preparation of geothermal technical documentation) and two small grant schemes (development of databases for shallow and deep geothermal energy), which resulted in the selection of 37 projects for financing.

The programme achieved a high financial absorption rate of 98.63%, and 38 out of 38 financed projects were successfully implemented, with the note that only one was completed beyond the eligibility period. The realisation of renewable energy sources (RES) projects resulted in the installation of 129.91 MW of geothermal, 12.16 MW of solar, and 1.95 MW of sea-based capacity, which together generated over 470 000 MWh of renewable energy annually, reducing CO_2 emissions by nearly 150 000 tonnes annually. These are significant contributions to the targets of Integrated National Energy and Climate Plan for the period 2021–2030 (NECP) (42,5% RES in total energy consumption). According to the Energy Development Strategy, Croatia has the technical capacity potential to use 456 MW of geothermal energy and 2,700 MW of solar energy,

[1] Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast) (Text with EEA relevance), OJ L 231, 20.09.2023, pp. 1-111.

[2] Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast) (Text with EEA relevance.), OJ L 328, 21.12.2018, pp. 82-209.

[3] Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast) (Text with EEA relevance), OJ L, 2024/1275, 08.05.2024.

which refers to PV systems on buildings. Although the implemented projects provide energy for public users and institutions, for comparison and ease of understanding of dimension of the investment, this amount of energy produced would cover the electricity supply needs of over 135 thousand households in Croatia.

An efficient and flexible programme governance, which allowed 12 projects to complete their activities using other funds to fully achieve project results after the final date of eligibility for project costs (30 April 2024), helped mitigate risks and ensure completion. Still, the programme encountered challenges, such as complex procurement procedures, permitting delays, inflation-related budget pressures, regulatory changes, limited administrative capacity and geopolitical challenges and disruptions in the global supply chain caused by the war in Ukraine. Simplification of procedures, better integration of national and EEA requirements, and a digital reporting platform are recommended to overcome the obstacles.

The programme impact is deep and wide-ranging. Public authorities and institutions, as well as citizens, benefited from improved comfort in public buildings, lower energy costs, cleaner air, and enhanced environmental awareness. The programme helped reduce fossil fuel energy production, supported a clean economy, and empowered communities to adopt and expand RES solutions. Notably, over 200 workshops, trainings, and public events enhanced knowledge and fostered a culture of sustainability.

The installed infrastructure, institutional knowledge, and capacity developed during the programme are expected to sustain benefits well beyond its official end date. Most projects have long operational life spans and are integrated into local energy and development plans. The creation of geothermal databases, feasibility studies, and renovation tools such as Building Renovation Passports further strengthen the foundation for future investments in clean energy technologies.

Bilateral cooperation was a hallmark of the programme, with 23 projects involving partners from Norway and Iceland. These collaborations led to 77 joint activities, including training, technology transfer and study trips. Croatian stakeholders gained access to international best practices, especially in geothermal energy and nZEB construction principles and standards. This bilateral framework fostered long-term relationships and institutional development on both sides.

To further enhance such partnerships, the future programme should support earlier partner engagement, structured matchmaking, dedicated bilateral budgets, and long-term cooperation models. Enforced visibility of successfully implemented projects could also inspire broader collaboration and replication.

In conclusion, the programme proved to be effective and impactful, providing a replicable model for community-focused, climate-resilient energy investments that significantly contributed to Croatia’s clean energy transition. Although the programme has concluded, Croatia's clean energy transition continues, and with sustained political and financial support, the results of this programme are well-positioned to drive continued progress toward national and EU energy and climate targets.

Introduction

This final report is the second deliverable of the evaluation of the Energy and Climate Change programme under the 'Evaluation of programmes financed under the European Economic Area (EEA) and Norwegian Financial Mechanisms for the period 2014–2021' contract, managed by the Ministry of Regional Development and EU Funds (MRDEUF), serving as the National Focal Point (NFP) for this programme. This (draft) final report contains a short description of the evaluation context, the methodology used, answers to the evaluation questions (EQs), findings, recommendations and annexes. The purpose of this service is to evaluate the Energy and Climate Change programme and the extent to which its objectives, including outcomes and outputs, were achieved. The evaluation assessed the relevance and coherence, efficiency, effectiveness, sustainability and impact of the programme and its components, the importance of and value that bilateral cooperation added to the results and outputs, and to the daily implementation of the programme's activities.

Context

The Energy and Climate Change programme

In December 2020, an agreement was signed between the Financial Mechanism Committee (FMC), representing Iceland, Liechtenstein, and Norway, and the Ministry of Regional Development and EU Funds of the Republic of Croatia, acting as the NFP for the beneficiary state. This agreement established the framework for the 'Energy and Climate Change' programme, which aims to foster sustainable energy practices in Croatia.

The total value of the programme was EUR 20 million: EUR 17 million from the Financial Mechanism of the European Economic Area (EEA FM) grants, EUR 3 million from national funding. Additionally, EUR 100 000 were allocated from the Bilateral Relations Fund.

The programme's central objective is to **reduce carbon intensity in energy production while enhancing the security of the energy supply in the country**.

The programme's objective was designed to be met through two primary outcomes:

- **Outcome 1: Improved energy efficiency**
- **Outcome 2: Increased renewable energy production**

Outcome 1 was expected to be realised through the implementation of the pre-defined project 'Establishment of the National training centre for nZEB', with Energy Institute Hrvoje Požar as the project promoter and the Faculty of Civil Engineering of the University of Zagreb as the project partner.

Outcome 2 was expected to be achieved through 37 projects, facilitated by the following four open calls and two small grant schemes:

- **Open call #1: Energy Production from the Sea**
  This initiative focused on harnessing the potential of sea-based energy sources, promoting technologies and projects that explored ocean energy as a viable and sustainable option for electricity production.
- **Open call #2: Increased Solar Energy Production Capacity**
  This call addressed the expansion of Croatia's solar energy capacities, encouraging investments and innovations increasing the generation of renewable energy from solar power.
- **Open call #3: Increased Geothermal Energy Production Capacity**
  The third open call aimed to boost the production of geothermal energy, tapping into Croatia's geothermal potential to support a cleaner and more sustainable energy mix.
- **Open call #4: Technical Documentation for Geothermal Energy**
  Aimed at enhancing technical knowledge, this call supported the development of detailed documentation necessary for the successful implementation of geothermal energy projects, laying the groundwork for future geothermal energy developments.
- **Small grant scheme 1: Shallow Geothermal Energy Database**
  This scheme focused on creating a comprehensive database of shallow geothermal energy resources, which could be used for heating and cooling applications, providing essential data for future geothermal projects.
- **Small grant scheme 2: Deep Geothermal Energy Database**
  Like the first one, this scheme was dedicated to collecting and organising data on deep geothermal energy resources, supporting the potential for large-scale geothermal electricity production.

Through these calls and schemes, the Energy and Climate Change programme aimed to transform Croatia's energy sector by increasing efficiency, expanding renewable energy production, and contributing to the country's commitment to reducing its carbon footprint. The collaboration between the FMC and the Ministry of Regional Development and EU Funds ensured that these projects aligned with Croatia's long-term energy goals, ultimately fostering a greener and more secure energy future.

Evaluation methodology

The evaluators used standard data collection and analysis methods to answer the evaluation questions. Relevant documents and data from secondary (administrative) sources formed the backbone of data sources. They were supplemented by primary sources, relying on interviews and field visits. Qualitative and quantitative methods were used in analysing the collected data.

The evaluation was based on data triangulation using the sources and methods described below.

Desk research

The desk research relied greatly on the repository of available programming documents, and the preliminary analysis of available documents and data sources[4].

Interviews

Interviews, as a qualitative research method, supplemented and clarified the results of the desk research and enabled in-depth insight into programme implementation and achievements. The target groups encompassed the Ministry of Regional Development and EU Funds of the Republic of Croatia as the Programme Operator, and the promoters of the three implemented projects. Four semi-structured interviews with representatives of the Programme Operator and project promoters were conducted online for the evaluation:

- 19 February 2025: interview with the MRDEUF (Programme Operator) and Energy Institute Hrvoje Požar (Programme Partner)
- 12 March 2025: interview with the City of Virovitica – Solar Roofs for Green Virovitica
- 18 March 2025: interview with the City of Topusko – Topusko smart thermal city – TopThermalCity
- 19 March 2025: interview with the City of Bjelovar – Increasing geothermal energy production capacity - Infrastructure works on the Korenovo GT-1 well

Field visits

Field visits were conducted for three projects. They were essential to assess the programme's impact in real-world contexts and gain a deeper understanding of its practical implementation. These visits observed how the objectives translate into tangible outcomes by engaging directly with stakeholders, identifying any challenges and successes on the ground. Combining qualitative insights from the field with quantitative data ensured that the evaluation captured a holistic view, enhancing the credibility and relevance of our findings. The following field visits were made:

- 14 March 2025: field visit to the Energy Institute Hrvoje Požar - Establishment of a National Training Centre for Nearly Zero-Energy Buildings (nZEB)
- 20 March 2025: field visit to Viktor Lenac - Seawater heat pump system Viktor Lenac
- 21 March 2025: field visit to the City of Velika Gorica - Velika Gorica Solar City – COUNTDOWN

[4] The key documents that were considered for the desk research are listed in Annex 2.

Research findings by evaluation criterion

RELEVANCE/COHERENCE

EQ1: To what extent was programme design relevant to the country context and coherent with national strategies? In relation to the priority areas, how did the programme provide added value?

The programme was highly relevant and well-aligned with Croatian energy and environmental priorities and strategic goals, addressing national key challenges such as energy dependency, climate vulnerability, and limited institutional capacity. The programme supported Croatia's transition to a low-carbon economy by promoting renewable energy, energy efficiency, and climate resilience, while also contributing to EU and EEA climate commitments.

Enhancing the development and utilisation of renewable energy sources (RES) based on new, innovative and sustainable technologies in the energy sector and accelerating the implementation of nearly zero energy building (nZEB) standards in the building sector are of high national interest and fully coherent with the following key strategic documents:

- Integrated National Energy and Climate Plan for the period 2021–2030 (NECP)
- Energy Development Strategy of the Republic of Croatia until 2030 with an outlook to 2050
- Strategy on adaptation to climate change of the Republic of Croatia until 2040 with an outlook to 2070
- Low-Carbon Development Strategy of the Republic of Croatia until 2030 with an outlook to 2050
- National Development Strategy of the Republic of Croatia until 2030
- Energy Development Strategy of the Republic of Croatia
- Fourth national action energy efficiency plan until 2019

The objectives outlined in NECP are well aligned with the Programme objectives.

The NECP target in reducing 62% greenhouse gas (GHG) emissions in the EU Emissions Trading System (ETS) sectors and 16.7% in the non-ETS sectors by 2030 is directly aligned with the programme's aim to mitigate climate change by reducing GHG emissions.

Programme's strong focus on increasing the use of RES by supporting projects of solar, biomass, and geothermal energy is directly aligned with NECP ambitious target of achieving a 42.5% share of RES in gross final energy consumption by 2030.

Through supporting nZEB renovation of public buildings and introducing smart energy management systems, the programme is directly in line with NECP targeting annual renovation rate of buildings to 3% during 2021–2030, with a ten-year average rate of 1.6%.

Additionally, the programme design is aligned with relevant legislative acts:

- Energy Act
- Renewable Energy Sources and High-efficiency Cogeneration Act
- Energy Efficiency Act
- Environmental Protection Act
- Climate Change and Ozone Layer Protection Act

Generally, the programme contributed to Croatia's Energy Development Strategy 2030 and Integrated National Energy and Climate Plan in multiple ways. One of the programme's main contributions was in the utilisation of renewable energy sources, which is a shared priority of both strategic documents. By funding solar and geothermal energy projects, particularly in public buildings and local communities, the programme helped reduce Croatia's dependence on imported fossil fuels and supported the national goal of increasing the share of renewables in final energy consumption. In terms of local energy systems and capacity building, the programme encouraged the development of decentralised and community-based energy initiatives, which directly supported the Energy Strategy's vision of empowering local stakeholders and building energy independence at the municipal level. Moreover, the programme strengthened administrative and technical capacities through training, international partnerships, and knowledge exchange — an essential element for implementing both key strategic documents.

The programme provided significant added value in the priority areas: increased renewable energy production, improved energy efficiency and enhanced collaboration between beneficiary and donor state entities.

During field visits and interviews, all stakeholders consulted expressed satisfaction with the programme design and the relevance of the priority areas and emphasised the importance of ongoing co-financing. Specifically, they highlighted the need to secure funding for infrastructure that supports the use of geothermal energy based on the prepared technical documentation.

The calls supported project applications focused on developing technical documentation for geothermal energy projects and implementing pilot projects to enhance the production and usage of heat generated from geothermal sources. Additionally, the calls facilitated the creation of online tools and databases for deep and shallow geothermal energy. Given the extensive length of the Croatian coastline, one of the calls aimed to support pilot projects and pre-investment studies for the installation of seawater heat pumps for heating and cooling purposes.

The most significant investments in RES in Croatia have focused on wind energy. In contrast, there has been a lack of investment in geothermal energy despite the known potential of the Pannonian Basin. Most geothermal resources in Croatia have temperatures ranging from 50 to 120°C, which makes them suitable for heating purposes. The added value of the Programme was to strengthen the cooperation with partners and share opportunities for knowledge transfer regarding geothermal energy from donors to Croatia, as well as to implement a pilot project for geothermal energy in the country.

This is the first financial mechanism designed to promote investment in geothermal energy in Croatia, and it is not surprising that public interest has been particularly high.

Croatia has substantial RES potential, particularly in solar energy, which has not been fully utilised, so the call supported project proposals for increasing capacities for energy production and use of solar energy. The added value is manifold, including intensive promotion of RES, cooperation among partners and knowledge sharing on solar energy between public buildings, cities and municipalities, as well as implementation of numerous solar energy pilot projects.

The establishment of the National training centre for Nearly Zero Energy Buildings in the EIHP in Zagreb was a significant step to increase capacity to prepare and implement renovation projects to achieve highly energy efficient and decarbonised Croatian building stock, which is currently responsible for about 40% of final energy consumption, and 36% of greenhouse gas emissions.

The key features of the training centre aimed at enhancing the implementation of nZEB standards include an educational platform and a pilot nZEB renovation in EIPH building. The centre serves as a hub for training and knowledge exchange on nZEB principles, targeting professionals engaged in the building and energy sector. A pilot nZEB project includes several key components:

- a 50 kW photovoltaic (PV) plant installed on the roof, supplying approximately 30% of the building's energy needs,
- the heating, cooling, and lighting systems were upgraded.
- These improvements led to an estimated 65% reduction in energy costs.
- Advanced building management systems are implemented to monitor and optimise energy consumption based on occupancy and comfort parameters.

EQ2: To what extent did the programme complement or had synergy with EU initiatives? What was the added value of the programme compared with similar EU initiatives?

The **European Green Deal**, launched in December 2019, is the European Union's flagship strategic initiative aimed at making Europe the first climate-neutral continent by 2050. It represents a comprehensive growth strategy that transforms the EU into a modern, resource-efficient, and competitive economy while ensuring no one is left behind in the transition.

The main objectives of the European Green Deal are:

- Climate neutrality by 2050, which is legally under binding the European Climate Law[5],
- Sustainable economic growth fostering green innovation, digitalisation, and a circular economy,

[5] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), OJ L 243, 09.07.2021, pp. 1-17.

- Just and inclusive transition ensuring fairness by supporting vulnerable regions and populations through the Just Transition Fund.

The programme significantly complemented and had synergy with the European Green Deal, integrating its key initiatives below.

- The 2020 European Green Deal Investment Plan (EGDIP), also known as the **Sustainable Europe Investment Plan** (SEIP), serves as the financial framework supporting the European Green Deal, aiming to mobilise at least EUR 1 trillion in sustainable investments over a decade to facilitate the transition to a climate-neutral economy by 2050. It operates within the broader context of the EU's multiannual financial framework and the NextGenerationEU Recovery Plan and encompasses various funding mechanisms, including the Just Transition Mechanism, designed to support the regions and sectors most affected by the green transition.
- The 2020 **EU Renovation Wave Strategy** is a major initiative launched by the European Commission on 14 October 2020 as part of the European Green Deal to improve the energy performance of buildings across Europe, making them more energy-efficient, sustainable, and climate-resilient. The key objectives of the EU Renovation Wave Strategy are:
    - Double the annual renovation rate by 2030, which is currently around 1%,
    - Renovate 35 million buildings by 2030 with a focus on deep renovations that significantly improve energy performances in buildings,
    - Reduce energy poverty by targeting the renovation of the worst-performing buildings and supporting low-income households to ensure a Just and Inclusive Energy Transition,
    - Create green jobs and stimulate the economy - building renovation is expected to create 160 000 additional green jobs in the construction sector alone.
- The **EU Strategy for Energy System Integration**, adopted on 8 July 2020, is a key component of the European Green Deal, which outlines the EU's vision for a more efficient, flexible, and sustainable energy system capable of reaching climate neutrality by 2050. Traditional energy systems have operated in silos (electricity, heating and cooling, transport, and industry), with separate infrastructures. The strategy aims to break down these silos by creating a 'smart, integrated energy system' where different sectors are interconnected and mutually supportive. It sets the blueprint for a unified, decarbonised energy system that is more efficient, interconnected, and renewable-based, which is essential to achieving the European Green Deal objectives and reshaping Europe's energy landscape for the future. The three main pillars of the strategy are:
    - a more circular energy system by using local energy sources more efficiently (e.g. waste heat recovery) and encouraging energy sharing between buildings, industries, and districts,

  - increased electrification by electrifying sectors like transport and heating using RES produced electricity and by expanding electric vehicle (EV) infrastructure and smart grids,
  - utilisation of clean fuels for hard-to-electrify sectors by scaling up renewable hydrogen, biogas, and synthetic fuels and by supporting new infrastructure like hydrogen pipelines and carbon capture.
- The **Fit for 55 Package**, launched on 14 July 2021, is a central part of the European Green Deal, laying the legal and policy groundwork for achieving climate neutrality by 2050 by:
  - putting the EU on track to reduce emissions by at least 55% by 2030,
  - modernising climate and energy legislation,
  - introducing fair, effective carbon pricing,
  - encouraging green innovation and investment,
  - supporting Just transition for citizens and regions.
- The **REPowerEU Plan** is the EU initiative launched in May 2022 that serves as an accelerator of the key European Green Deal pillars, particularly in the areas of energy security, RES development, energy efficiency and smart electrification. It shares the European Green Deal objectives but was specifically designed to:
  - rapidly reduce the EU's dependency on Russian fossil fuels,
  - speed up the rollout of renewable energy,
  - increase energy savings and system resilience.

The Energy and Climate Change programme aligned closely with the five main pillars of the European Green Deal, complementing its key initiatives such as the Sustainable Europe Investment Plan, the EU Renovation Wave Strategy, the EU Strategy for Energy System Integration, the Fit for 55 Package and the REPowerEU Plan. The programme achieved this synergy through the following:

1. supporting the European Green Deal's climate neutrality objective through financing projects that reduce greenhouse gas emissions, improve energy performance in buildings and expand local use of RES.
2. accelerating energy efficiency and renovation through funding deep renovations of public and residential buildings and nearly zero-energy building pilot projects.
3. expanding renewable energy use through funding local renewable energy projects (solar and geothermal), encouraging innovation in energy systems integration and promoting decentralised and community-based energy solutions.
4. Ensuring a just and inclusive energy transition through supporting municipalities and public institutions in less developed EU countries like Croatia and promoting socially inclusive energy and climate action that leaves no one behind.
5. Building capacity and knowledge through training programmes, workshops, technical assistance, bilateral cooperation between donor and recipient countries and knowledge transfer for smart energy and climate planning and implementation.

Additionally, the programme enhances compliance with the following EU directives.

- The **Energy Efficiency Directive** (EED)[6], sets legally binding targets for reducing final energy consumption and introduces stronger obligations for public sector energy efficiency, energy savings, and energy planning. The programme supports compliance with the Energy Efficiency Directive by:
    - funding energy renovation projects for public buildings, helping meet EED obligations to reduce energy use in public infrastructure,
    - providing capacity building and training for public authorities, energy managers, and building operators according to Article 5,
    - delivering energy planning tools to help institutions develop local and regional energy efficiency action plans in line with national targets.
- The **Renewable Energy Directive** (RED III)[7],adopted in October 2023 as part of the Fit for 55 package, supports the EU's 2030 climate targets and long-term goal of climate neutrality by 2050 by increasing the share of renewable energy in the EU's overall energy mix to at least 42.5% by 2030, with an aspirational top-up target of 45% and by setting sector-specific renewable targets for buildings, transport, and industry. The programme ensures compliance with the Renewable Energy Directive by:
    - financing RES systems (e.g. photovoltaics and geothermal) in public and commercial buildings and facilities and demonstration projects that showcase integrated RES systems (e.g. hybrid heating),
    - funding decentralised and community-based RES projects, such as heat pump installations and hybrid systems, in line with RED III provisions on local energy communities.
- The **Energy Performance of Buildings Directive** (EPBD)[8], adopted in April 2024, aligns the building sector with the EU's 2050 climate neutrality objective, requires all new buildings to be zero-emission from 2030 (2028 for public buildings), mandates minimum energy performance standards (MEPS), and promotes digital building logbooks and renovation passports. The programme enhances compliance with the Energy Performance of Buildings Directive by:
    - funding deep renovations of existing public buildings to meet nZEB or zero-emission standards,
    - establishing national training centres, such as nZEB training centre in Energy Institute Hrvoje Požar, to upskill professionals in nZEB design and retrofitting techniques,
    - supporting the development of building renovation strategies, including digital tools like Building Renovation Passports and Energy Performance Certificates (EPCs).

[6] Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast) (Text with EEA relevance), OJ L 231, 20.09.2023, pp. 1-111.

[7] Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast) (Text with EEA relevance.), OJ L 328, 21.12.2018, pp. 82-209.

[8] Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast) (Text with EEA relevance), OJ L, 2024/1275, 08.05.2024.

More generally, the programme directly strengthened Croatia's capacities to implement and comply with the EED, RED III, and EPBD by:

- providing financial support for RES and EE projects,
- enhancing institutional and technical capacity,
- supporting training, planning, and monitoring,
- enabling inclusive and regionally balanced implementation.

Additionally, the programme often acted as a preparatory tool for more extensive EU investments by supporting pilot projects, feasibility studies, and energy planning that paved the way for scaling up through EU structural or innovation funds.

The programme served as a complementary mechanism to EU funding, enhancing the overall EU climate and energy policy landscape by filling gaps, reaching underrepresented beneficiaries, and providing effective, equitable, and flexible support that aligns with and reinforces the goals of the European Green Deal.

Similar EU funding programmes and initiatives include:

- the LIFE programme,
- Horizon Europe – Cluster 5 (Climate, Energy and Mobility),
- the European Regional Development Fund (ERDF),
- the Innovation Fund (IF),
- the Just Transition Fund (JTF),
- the Modernisation Fund (MF),
- InvestEU – Sustainable Infrastructure Window,
- the Connecting Europe Facility (CEF) – Energy.

Unlike many EU programmes that focus on innovation, competitiveness, or large infrastructure projects, the Energy and Climate Change programme emphasised social equity, local implementation, and capacity building. It prioritised energy efficiency, renewable energy deployment, and climate adaptation at the community level, especially in vulnerable or underserved regions.

One of the programme's distinctive features was its focus on social inclusion and regional cohesion, ensuring that public authorities and institutions, as well as commercial facilities, can actively participate, and providing grant-based financing, which reduces the administrative and financial burden for local stakeholders. Targeting the decarbonisation of Europe by 2050, it is vital to include all stakeholders: public authorities and institutions, citizens, citizen energy communities, private companies and NGOs in the regional production and supply of RES as a key factor for a clean energy transition process.

A key added value of the programme was its support for capacity building. It funded technical training, energy planning assistance, and institutional development — areas that similar EU programmes frequently overlook or assume already exist. This helped strengthen national and local capabilities to implement and sustain energy and climate projects effectively.

Moreover, the programme promoted bilateral cooperation between donor countries and beneficiary states, enabling knowledge exchange and long-term partnerships. A significant advantage of the programme compared with similar EU programmes was the organisation of many workshops and study trips. This model encouraged the transfer of best practices and lessons learnt, consequently accelerating a clean energy transition.

EFFECTIVENESS

EQ3: To what extent has the programme achieved the planned results, taking into account the specific issues of the programme?

After analysing the final reports of 38 implemented projects and conducting interviews and field visits, it can be concluded that the program achieved its planned results, and in some aspects gone beyond initial expectations.

Planned activities have been implemented, programme indicators have been met, and significant progress has been made in education and exchange of knowledge and experience.

The programme has successfully achieved its main outcomes:

Outcome 1: Improved Energy Efficiency

Outcome 2: Increased Renewable Energy Production

Outcome 1: Improved Energy Efficiency has been achieved through a predefined project: Establishment of a National Training Centre for Nearly Zero-Energy Buildings (nZEB) led by the Energy Institute Hrvoje Požar, in collaboration with the Faculty of Civil Engineering at the University of Zagreb. The project includes retrofitting of EIHP office building to nZEB standards and establishment of it as the National Training Centre for nZEB.

Outcome 2: Increased Renewable Energy Production has been achieved through six calls for proposals, which supported 37 projects focused on increasing the production of energy from solar, sea, and geothermal sources. A total of 35 projects were funded through open calls, while two projects received support through small grants.

The supported projects installed a total of 129.91 MW of geothermal energy, 12.16 MW of solar energy, and 1.95 MW of sea-based energy. Interactive databases for deep and shallow geothermal energy potential were also developed, supporting research and investment planning. Additionally, four locations for well drilling were successfully prepared, seven existing wells are ready for geothermal energy exploitation, and one well was successfully drilled as planned. Achieved results are very significant bearing in mind that according to the Energy Development Strategy, Croatia has the technical capacity potential to use 456 MW of geothermal energy and 2,700 MW of solar energy, which refers to PV systems on buildings.

By the end of the programme, renewable energy projects were generating a combined total of over 470,000 MWh per year and reducing CO_2 emissions by nearly 150,000 tonnes annually. These are significant contributions to the targets of Integrated National Energy and Climate Plan for the period 2021–2030 (NECP) (42,5% RES in total energy consumption). Although the implemented projects provide energy for public users and institutions, for comparison and ease of understanding of dimension of the investment, this amount of energy produced would cover the electricity supply needs of over 135 thousand households in Croatia. In addition, over 200 workshops and public awareness events were organized, enhancing stakeholder engagement and education.

One of the Programme's significant achievements was the strengthening of partnerships with donor countries, particularly Norway and Iceland. A total of 23 out of 37 projects involved cooperation with donor entities. These partnerships facilitated 77 joint activities, including study visits and knowledge-sharing events and enabled the transfer of technical expertise and best practices, which contributed to the successful implementation and future sustainability of the projects.

Examples of strong bilateral projects include collaborations on geothermal energy systems in Karlovac, Topusko, and Bjelovar, which helped adapt Icelandic and Norwegian solutions to the Croatian context.

Overall, the Programme demonstrated substantial progress in increasing renewable energy production, improving energy efficiency and emission reduction, exceeding many of its initial targets and contributing to energy transition in Croatia. Such interventions have significant positive impacts on improving image of the cities and show how targeted investment and cooperation can deliver measurable and long-lasting benefits in the fields of energy and climate change at local, regional and national levels.

EQ4: Which factors have influenced/influence the achievement or non-achievement of the planned outcomes?

Several factors have influenced both the achievement and the potential non-achievement of the planned outcomes of the Programme. These factors can be grouped into enabling factors that supported success, and limiting factors that posed challenges or required mitigation.

Factors that positively influenced the achievement of the planned outcomes are:

- Effective and Flexible Programme Management and Coordination;
- High Demand and Engagement;
- Strong Project Design and Stakeholder Engagement;
- Public Awareness and Capacity Building;
- Effective Bilateral Cooperation.

Effective and Flexible Programme Management and Coordination

Due to management changes (withdrawal of the initial Programme Operator), the launch of the Programme was rescheduled, allowing the new Programme Operator to ensure

the highest quality in the publication of the open calls for proposals. Programme's implementation risks ware minimized by cooperating among the relevant Programme's bodies and by the management and control systems established which ensured a respect of the principles of accountability, economy, efficiency and effectiveness as well as the key requirements from Regulation.

The Ministry of Regional Development and European Union Funds (MRDEUF) as the Programme Operator as well as the National Focal Point facilitated that the Programme was implemented fully in accordance with the legal framework of the EEA and Norwegian Financial Mechanisms, and it monitored the progress and quality of the implementation.

Nominating and joining the EIHP as a Programme partner ensured quality support, which was particularly appreciated and emphasized by beneficiary representatives during interviews and field visits.

Additionally, the Programme Operator and Project Promoters demonstrated adaptability by adjusting budgets, timelines, and scopes when faced with unexpected challenges. Flexibility measures allowed 12 projects to extend their activities beyond formal deadlines to fully achieve planned outcomes.

High Demand and Engagement

The strong interest from municipalities, public institutions, and the private sector, led to the submission of numerous high-quality project proposals, which allowed the Programme Operator to select impactful and technically sound projects, contributing to the achievement of the planned outcomes.

Strong Project Design and Stakeholder Engagement

The Programme was based on thorough stakeholder consultations, ensuring that the Calls for Proposals and project objectives addressed actual national needs. This participatory approach helped align the Programme with Croatia’s energy priorities and EU policies.

Effective Bilateral Cooperation

Partnerships with Norway and Iceland entities played a key role in knowledge transfer and technical support. These collaborations enriched project implementation, particularly through study visits, training, and the adoption of best practices in renewable energy and energy efficiency. Particularly, Norwegian and Icelandic knowledge and experience on geothermal energy as the base for knowledge transfer facilitated a selection of the best relevant projects and promising locations for geothermal pilot projects achievable in the next period.

Public Awareness and Capacity Building

A comprehensive communication strategy, public workshops, and professional training helped build awareness and increase capacity among stakeholders, which enhanced understanding and support for renewable energy and energy efficiency initiatives.

On the other hand, factors that negatively influenced or risked the achievement of the planned outcomes include:

- Administrative Complexity;
- Procurement and Financial Challenges;
- Regulatory and Grid Connection Delays;
- Global Disruptions: COVID-19 and Geopolitical Instability;
- Technical and Geological Surprises;
- Limited Administrative Capacity in Smaller Municipalities.

Administrative Complexity

Due to administrative complexity some of the implemented projects experienced delays in obtaining permits, especially for infrastructure involving public land (e.g. geothermal wells). These delays affected timelines and in some cases led to the partial implementation of planned components (e.g. the water-to-water heat pump and EV charging stations as the part of the predefined project in EIHP).

Procurement and Financial Challenges

Public procurement processes proved to be complex and time-consuming. Rising material and equipment costs, partly due to inflation and global market shifts, exceeded initial budgets and consequently some projects had to reduce their scope or request additional funds.

Regulatory and Grid Connection Delays

Some projects faced prolonged approval processes from regulatory bodies and energy providers like the Croatian Electricity Utility (HEP) for connecting RES installations to the grid. These delays postponed RES system operation.

Global Disruptions: COVID-19 and Geopolitical Instability

The COVID-19 pandemic caused delays in supply chains, travel restrictions, and interruptions to in-person training and cooperation. Additionally, the war in Ukraine

impacted the availability and cost of construction materials and energy-related equipment.

Technical and Geological Issues

Some projects involving geothermal drilling or solar infrastructure encountered unforeseen technical issues, such as deeper-than-expected drilling needs or structural challenges on buildings. These problems led to cost increases and schedule changes.

Limited Administrative Capacity in Smaller Municipalities

Some smaller or less experienced beneficiaries lacked the administrative and technical capacity to manage large-scale projects, navigate procurement rules, or comply with reporting requirements, what slowed project implementation and required additional support from Programme Operator and Partner or from external consultants.

The Programme was successful mostly due to effective and flexible management, efficient planning, and committed partnerships. However, its outcomes were also shaped by several external and internal challenges. The factors that most significantly influenced the achievement of outcomes included administrative complexity and prolonged approval processes from regulatory bodies and energy providers.

EFFICIENCY

EQ5: To what extent is the programme adapted to the institutional and administrative capacities of the programme operator and project promoters?

The Programme was, for the most part, appropriately adapted to the institutional and administrative capacities of both the Programme Operator and the Project Promoters. However, the implementation process also revealed several areas where further adaptation could have improved overall efficiency and ease of execution.

The Programme was well aligned with the capacity of the Programme Operator, which demonstrated strong leadership and operational oversight throughout the implementation period. PO had an effective institutional framework and extensive experience in managing EU and EEA-funded programmes and it successfully established all necessary management and control systems in accordance with the requirements of the EEA Financial Mechanism. This included setting up financial monitoring tools, ensuring proper compliance with regulations, and maintaining regular communication with project promoters and other key stakeholders.

The involvement of the EIHP as a Programme Partner significantly contributed to the Programme's success. As one of the key leaders in Croatian energy sector, EIPH provided

tailor-made technical support to Project Promoters. In parallel, EIHP was the project promoter of the pre-defined project: Establishment of the national training centre for nZEB.

Based on the thorough analysing of the final reports of 38 implemented projects and conducting interviews and field visits, it can be concluded that the Programme was overall adapted to the institutional and administrative capacities of the Project Promoters. They were mainly cities, municipalities and public institutions that were familiar with energy policies and had adequate administrative capacities and experience with implementing RES and EE projects. Additionally, majority of them are experienced in various EU financing mechanisms.

However, some Project Promoters experienced issues with staff turnover or limited internal technical capacity. These challenges created difficulties in maintaining continuity throughout the project lifecycle and necessitated an involvement of external consultants, which increased costs and required additional coordination.

EQ6: To what extent were the programme activities implemented in the available time period?

The Programme activities were largely implemented within the available time period, although several projects required flexibility measures and deadline extensions to fully achieve their planned outputs and results. Despite various delays, the programme reached a completion rate of over 98%, reflecting a high level of implementation efficiency given the challenging context.

The official end date for all projects and programme-related activities was set for 30 April 2024. While most of the projects were completed within the designated timeframe, 12 projects were granted flexibility measures. These measures allowed the projects to continue certain activities beyond the original deadline to fully achieve their expected results and performance indicators. These extensions were formally approved and did not compromise the programme's compliance or financial execution.

Only one project, Clean Energy for Vukovar, was listed as partially completed due to regulatory delays and administrative challenges. Although the project was initially granted flexibility to extend implementation until 31 December 2024, not all planned activities could be finalised within that timeframe. The remaining activities of the project are expected to be completed by June 2025 while the continuation of the unfinished components will take place under the City of Vukovar's local project management without further EEA funding.

Additionally, pre-defined project: Establishment of the National training centre for nZEB faced difficulties in resolving property-legal relations with the City of Zagreb for the purpose of installing a water-to-water heat pump. Moreover, special limitations for instalment of the charging stations occurred as the area surrounding the EIHP's building is the public surface, in the jurisdiction of the City of Zagreb. Regarding the e-vehicle charging stations, the initial investigation of the market for bi-directional charging

stations has been performed and based on the feedback from four potential suppliers of the equipment, there are no available V2G solutions in the market for Croatia. Consequentially, certain modifications to planned activities have been made.

EQ7: What are the main factors that cause delays in implementation and in what ways?

Based on the analyses of the final reports of 38 implemented projects as well as on the carried-out surveys and interviews with Project Promoters, the identified key factors that cause delays in implementation are the following:

- Complex and Lengthy Public Procurement Procedures;
- Difficulties in Obtaining Permits and Regulatory Approvals;
- COVID-19 Pandemic and Global Supply Chain Disruptions;
- Rising Costs and Inflation;
- Construction and equipment delivery delays;
- Staff Turnover and Limited Administrative Capacity;
- Late Regulatory Changes.

Complex and Lengthy Public Procurement Procedures

A common challenge for all Project Promoters from public institutions was in implementing public procurement rules in accordance with the Public Procurement Act, aiming to follow an open procurement procedure, preventing any favouritism and conflict of interest and ensure a fair competition between potential providers and a transparent contracting. All steps of public procurement procedure, including a preparation of tender documentation, a publication of calls for bids, the evaluation of offers, and the signing of contracts are time-consuming, and, in some cases, procedural errors led to cancelled tenders or the need to repeat the procurement process. A significant number of identified irregularities were related to non-compliance with public procurement rules and procedures. These complications delayed the launch of works, the delivery of equipment, and the overall implementation timeline of the projects.

Difficulties in Obtaining Permits and Regulatory Approvals

Majority of the projects reported some kind of delays due to difficulties in obtaining the necessary permits and approvals. This was especially true for projects that involved geothermal drilling, installations on public land, or connections to the national electricity grid. Regulatory bodies and electricity providers such as HEP, were very slow to process necessary documentation. For example, the Clean Energy for Vukovar project was delayed because the exploration area had to be changed, and the revised documentation required additional approvals. Several projects involving photovoltaic installations faced delays in grid connection approvals by HEP ODS. In some cases, contracts had to be extended due to prolonged approval times. Additionally, few projects faced very long and comprehensive environmental impact acceptance procedure. Since the utilization of RES represents a direct response to increasing environmental threats, it is paradoxical that an environmental impact assessment procedure is the single longest procedure in the entire permitting process for RES projects.

Reported difficulties in obtaining permits and regulatory approvals resulted in postponed construction, commissioning, and re-design of certain components and activities of implemented projects.

COVID-19 Pandemic and Global Supply Chain Disruptions

The COVID-19 pandemic had a notable impact on the Programme's timeline. Lockdowns, travel restrictions, and health and safety measures disrupted on-site work, delayed training activities, and postponed procurement processes. In addition, global supply chain disruptions led to delays in the delivery of construction materials, technical equipment, and specialist services. These interruptions slowed down implementation of projects across multiple sectors, particularly during 2020 and 2021.

Rising Costs and Inflation

During the Programme's implementation period, particularly in the final years, inflation and rising prices for construction materials, energy systems, and labour created significant financial pressures. Original project budgets, which were calculated before these increases, became insufficient to cover all planned activities. Some projects had to adjust their scope, reduce certain components, or apply for additional funding under the restricted call for proposals. In several cases, delays occurred because additional time was needed to reallocate resources or revise technical plans to stay within budget.

Construction and equipment delivery delays

Construction and equipment delivery experienced significant delays due to unforeseen technical challenges, structural issues, and supply chain disruptions.

Staff Turnover and Limited Administrative Capacity

Some Project Promoters experienced internal staffing challenges, including the turnover of key personnel responsible for project coordination, procurement, or reporting. This resulted in discontinuity and a loss of necessary expertise, which slowed down decision-making and day-to-day implementation. Additionally, some municipalities and smaller institutions lacked sufficient administrative capacity and experience with EEA or EU-funded projects. As a result, they struggled with meeting reporting requirements, following procurement procedures, and managing technical tasks.

Late Regulatory Changes

Changes in national regulations related to energy infrastructure were introduced in August 2024. These regulatory updates created additional administrative burdens for some projects, which had to revise their documentation or reapply for certain approvals under the new rules.

EQ8: How can the factors that cause delays be best mitigated?

A combination of proactive planning, capacity building, regulatory streamlining, and flexible management is required to mitigate the factors that cause delays in projects implementation. Below we list measures that specifically relate to project promotors.

The Mitigation Measures for Complex and Lengthy Public Procurement Procedures include:

- Establish a public procurement advisory team to offer ongoing support and pre-checks or engage public procurement experts early in the process to advice and support Project Promoters;
- Deliver mandatory training and workshops on public procurement rules and best practices before projects start;
- Conduct market research before tendering;
- Ensure Centralized procurement system using lessons learned from project One Sun Connecting North and South led by the Regional Energy Agency North (REA North);
- Allow more realistic procurement timelines in project planning to reflect administrative realities.

Representatives of REA North particularly highlighted the best practice of a Centralized procurement system integrated a unified procedure for procurement of equipment for 18 partners (8 cities, 8 municipalities, and 2 universities) involved in the One Sun Connecting North and South project. The achieved results, particularly more favourable procurement prices and significant reduction of the process duration, were very satisfactory and promising.

The Mitigation Measures for Improving Permit and Regulatory Approval Processes are:

- Encourage early engagement with permitting authorities during the project design phase;
- Develop a "fast-track" coordination mechanism between the Programme Operator and key regulatory bodies (e.g. HEP, local land registries, etc.);
- Explore alternative pathways for grid integration, such as independent certification for compliance;
- Create and share guidelines for the most common permitting procedures, tailored to energy infrastructure projects;
- Integrate permitting milestones into project timelines and risk management plans.

The Inflation and rising costs can be mitigated by:

- Requiring the inclusion of contingency reserves in project budgets (e.g. 10–15% of total);
- Offering restricted calls for supplementary funding, as was done during the Programme to help cover justified cost increases;
- Encourage phased implementation plans, where core infrastructure is prioritised, and optional components can be added later if funding permits.

The Mitigation Measures addressing Staff Turnover and Limited Administrative Capacity include:

- Provide mentorship or pairing with more experienced institutions (e.g., city-to-city cooperation);
- Develop toolkits for project management and reporting, tailored to local needs;
- Encourage the use of external consultants only where internal capacity is demonstrably insufficient and provide a guidance on how to select and manage consultants effectively;
- Offer introductory and refresher training for newly assigned staff throughout the project lifecycle.

Late Regulatory Changes can be mitigated by:

- Establishing a regulatory monitoring function within the Programme Operator or Partner to track relevant policy changes;
- Maintaining close communication with national ministries and involve them in the next Programme design to ensure regulatory alignment;
- Including a provision for adjusting technical documentation in project plans, in case of policy updates.

Construction and equipment delivery delays can be mitigated by conducting thorough risk assessments and detailed feasibility studies early in the project to anticipate technical challenges. Additionally, establishing clear timelines with buffer periods, securing reliable suppliers, and holding regular coordination meetings with contractors can help manage delays and maintain project momentum.

EQ9: Are there more efficient ways to achieve programme results?

Based on the analyses of final reports of 38 implemented projects as well as on the conducted interviews and the filed visits, the identified ways to enhance and accelerate the achievement of the Programme results include:

- Ensuring proactive and flexible Programme management and coordination;
- Assessing the administrative and technical capacities of Project Promoters before project approval to provide targeted trainings and tailored support;
- Conducting detailed risk assessment for each of the approved projects;
- Ensuring that funded projects are closely aligned with national, regional and local energy and climate action plans and strategies - projects that are already integrated into existing development plans, zoning documents, or national, regional and local energy and climate targets are more likely to face fewer administrative obstacles and to gain quicker support from relevant authorities;
- Offering Project Promoters access to pre-approved technology packages which include standard solutions for common technologies such as photovoltaic

systems, heat pumps, or electric vehicle charging stations - by using proven technical designs, Project Promoters would be able to save time on planning and reduce the risks of technical errors or delays during installation and permitting;
- Setting the project activities within realistic financial and timeframes;
- Enabling full transparency and making the outcomes visible to increase the acceptance and legitimation of the projects;
- Introducing real-time monitoring tool to improve Programme oversight and efficiency, to support better decision-making and to prevent small issues from turning into larger problems – it will allow both the Programme Operator and Project Promoters to continuously track progress, identify delays early, and take corrective action when needed;
- Regarding cost for administrative staff, consider specifying the appropriate unit prices in accordance with average salary including the required social security contributions;
- Engaging public procurement team or individual experts to advice and support Project Promoters from the early stage;
- Simplifying the reporting procedures – Project Promoters pointed out that the requested reports were very extensive, frequent and time-consuming;
- Introducing interactive digital platform for reporting and "paper free" reports;
- Considering following the reporting practice of EPEEF, which requires reports with the prescribed minimum amount of claims for funding every 6 months;
- Enhancing collaborations among stakeholders with complementary expertise to facilitate the implementation of complex projects requiring specialized knowledge;
- Conducting detailed project preparation involving a collection of quality and reliable data, analyses of potential investments and an establishment of a multidisciplinary project team of diverse experts with necessary knowledge and experience.

Generally, the Programme could be more efficient by simplifying procedures, especially concerning reporting and payment.

EQ10: How many financial and human resources are needed for the preparation and implementation of the programme? Which elements bring administrative burden? Are there elements of programme preparation and implementation that could be simplified?

The preparation and implementation of the Programme required a combination of financial and human resources, which were carefully planned and managed by the responsible institutions, namely: the Directorate for European Territorial Cooperation within MRDEUF as the Programme Operator, the Norwegian Water Resources and Energy Directorate (NVE) as the Donor Programme Partner and EIHP as the Programme Partner.

The Management structure was established in accordance with Programme agreement and regulation, which prescribed responsibilities and tasks. The Organisational structures

of the Programme Operator and Programme Partner ensured independence and functional separation of the divisions responsible for verification of incurred expenditure and approval of payments from the divisions responsible for the implementation of the Programme.

Financial Resources

The total amount of financial resources allocated for the Programme management was 1.110.000 €. This budget covered all costs related to the administration, coordination, and supervision of the Programme throughout its implementation period.

The funding for the Programme management was divided as follows:

- The EEA Grants contributed 943.500€ which represented the primary portion of the management budget;
- The remaining 166.500€ was provided through national co-financing, covering 15% of the total.

This budget was used to finance various operational and administrative activities, including:

- Salaries for staff members working on the Programme;
- Travel and accommodation expenses for business trips, inspections, and international events;
- The organization of training sessions, workshops, and conferences;
- Administrative overhead and logistical support;
- External audits and financial control mechanisms to ensure compliance with EEA requirements.

All eligible management costs were incurred as planned, and the entire 1.11 million € was reported and approved as eligible expenditure.

Human Resources

The implementation of the Programme required a well-organized team across several roles and institutions:

- Programme Operator: The main implementing body, responsible for overall management, compliance with financial rules, Programme coordination, and communication was MRDEUF.
- Programme Partner: A technical institution, EIHP acted as the technical and operational partner supporting Project Promoters in technical aspects of their projects' implementation.
- Estimated Staffing Needs:

- Programme Management Team: At least 7 full-time staff would be needed for effective oversight, financial control, coordination, and communication tasks;
- Technical Experts: Approximately 10 to 15 experts would be required to manage and assess energy-related projects, provide technical support, and lead training activities;
- Trainers and Educators: Around 5 to 10 professional trainers would be needed to conduct tailor-made trainings of relevant energy sectors;
- Monitoring and Audit Personnel**:** A team of about 5 to 7 people would be needed to perform on-site monitoring visits, conduct audits, and verify project implementation;
- Administrative and Communications Staff: Between 3 and 5 support staff would be responsible for organizing events, managing logistics, processing documentation, and maintaining communication platforms;
- International Experts: Several international experts from partner countries (e.g., Norway, Iceland) would be engaged on a project basis to facilitate bilateral cooperation, knowledge transfer, and study visits.

The combined financial and human resources would be used for:

- Administrative coordination and communication with the EEA Financial Mechanism Office;
- Financial compliance and reporting to the EEA Grants Financial Mechanism Office;
- Day-to-day Programme administration;
- Technical and financial monitoring of individual projects;
- On-site inspections and field visits to verify project progress;
- Training and capacity-building events for Project Promoters;
- Bilateral cooperation initiatives, including joint study visits and participation in international conferences.

Several elements of the Programme were identified as the administrative burden for both the Programme Operator and the Project Promoters. These burdens primarily resulted from strict compliance requirements, complex procedures, and limited administrative capacity at the local level.

The main elements that increased the administrative workload are as follows:

- Public procurement procedures (elaborated in detail in the prior chapters);
- Permitting and regulatory approvals (elaborated in detail in the prior chapters);
- Financial Reporting and Documentation - Project Promoters were required to submit detailed documentation for all expenditures, including invoices, bank statements, payment confirmations, and procurement records. These documents had to meet both Croatian national standards and EEA-specific requirements,

which were not always fully aligned. This often resulted in an increased burden on project administration;

- Monitoring and Evaluation Obligations - both the Programme Operator and the Project Promoters were responsible for preparing and submitting various reports, including progress reports, final reports, and outcome documentation. These reports required detailed data collection, performance measurement, and justification of results, often with supporting evidence. The preparation of these documents demanded significant time and human resources;
- Communication and Coordination Between Institutions - administrative burden was also increased by the need for frequent communication and coordination between multiple stakeholders;
- Adjustments due to Regulatory or Budgetary Changes - making these adjustments often required submitting amendments, re-budgeting, and rescheduling activities, all of which added to the administrative workload of both the Programme Operator and the Project Promoters.

Based on the detailed analyses of the Programme annual reports, of the final reports of 38 implemented projects and on the conclusions from interviews with PO and PP, the elements of the Programme preparation and implementation that could be modified to reduce the administrative burden include:

- Simplification of the public procurement procedures;
- Streamline of the permitting processes;
- More user-friendly financial reporting requirements;
- More efficient monitoring and evaluation processes;
- Simplification of the project Application and Selection Processes;
- Centralisation of the Communication and Coordination Mechanisms;
- Clarified and Standardized Guidelines and Instructions.

Simplification of the Public Procurement Procedures

Public procurement was one of the most administratively demanding aspects of project implementation. The complexity of national procurement laws, combined with EEA-specific requirements, often caused confusion and delays. In the next Programme perspective, the preparation phase could include the development of simplified procurement guidelines with practical examples tailored to energy-related investments. The Programme Operator could also offer model tender documents and pre-approved procurement templates, which would help Project Promoters avoid procedural mistakes and save time.

Streamline of the Permitting Processes

Many projects experienced delays due to slow and complicated permitting procedures, especially for geothermal drilling, construction on public land, or grid connections. To simplify this element, a centralized coordination mechanism or a "one-stop shop" for

energy permits could be established. This would allow Project Promoters to deal with fewer institutions and reduce the number of repeated submissions or conflicting instructions. Including clear step-by-step permitting guidance during the preparation phase would also improve planning and reduce the need for extensions later.

More User-Friendly Financial Reporting Requirements

The financial reporting process involved the collection and submission of large volumes of supporting documents, which were often difficult to manage. To simplify this, the next Programme perspective could introduce a standardized digital reporting platform with clear instructions and automated document checklists. In addition, greater harmonization between EEA and national financial documentation rules would help prevent duplication and reduce the effort required to prepare reports.

More Efficient Monitoring and Evaluation processes

Although monitoring is necessary for accountability and learning, the frequency and complexity of required reporting created additional work for Project Promoters. The process could be simplified by consolidating progress and financial monitoring into fewer, more streamlined formats. Smaller projects could benefit from lighter reporting requirements, based on their size and risk level.

The monitoring visits to project sites were conducted by representatives of the PO in collaboration with the EIHP.

The PO conducted on-the-spot controls (OTSC) in various cities, including: Rokovci and Andrijaševac, Varaždin, Dubrovnik, Karlovac, Šibenik, Medulin, Vukovar and Rovinj.

Simplification of the Project Application and Selection Processes

During the preparation phase, some applicants found the application forms, budget templates, and technical documentation requirements overly detailed or difficult to complete. The next Programme perspective could benefit from a two-step application process, where an initial concept note is submitted first, followed by a full proposal for shortlisted projects. This would reduce unnecessary effort and allow the Programme Operator to focus support on the most promising projects.

Centralisation of the Communication and Coordination Mechanisms

Communication between the Programme Operator, the Programme Partner and the Project Promoters could add to the administrative burden of all engaged parties. A dedicated helpdesk or single point of contact within the Programme Operator's or Programme Partner's office could provide quicker answers to technical and procedural questions. Furthermore, regular virtual check-ins or online platforms could help all parties track project status and resolve issues in real time.

Clarified and Standardized Guidelines and Instructions

In many cases, Project Promoters had to interpret complex or unclear instructions, particularly related to eligibility rules, cost categories, and environmental procedures. These issues could be resolved by the PO preparing user-friendly, illustrated guidance documents in the national language, accompanied by training sessions or video tutorials that explain the most critical procedures in plain terms.

SUSTAINABILITY AND IMPACT

EQ11: What has the impact of the programme on project partners and final beneficiaries been? How has the programme contributed to improving the quality of life of target groups and final beneficiaries?

The impact of the Programme on project partners and final beneficiaries has been broad and highly positive, contributing to enhance institutional capacity, technical knowledge, environmental awareness, and long-term sustainable energy practices across Croatia.

The Programme facilitated substantial knowledge transfer, capacity building, and policy development, contributing to a more sustainable and energy-efficient future in Croatia.

Overall results are key to sustainable changes in regional and local self-government units across the country. All implemented projects were benefiting cities, municipalities, households and businesses by reducing energy costs and dependence on fossil fuels. Finally, all projects contributed to reducing CO_2 emissions and improve environment.

All but one project, covering 46 locations across Croatia, including 14 municipalities, 32 cities and 19 counties were successfully completed and achieved their project objectives, which would ensure continued long-term benefits in various dimensions.

Aiming to achieve a highly energy efficient and decarbonized building stock and to ensure that the long-term renovation strategies deliver the necessary progress towards the transformation of existing buildings into nZEB, the National training centre for nZEB in EIHP was established.

Two related projects implemented by the City of Bjelovar: Development of technical documentation for the use of geothermal energy in the area of Veliko Korenovo and Increased geothermal energy production capacity – infrastructural activities at drill hole Korenovo GT-1, resulted in geothermal well drilling and an installed capacity of 4.1 MW. The estimated annual energy production from the well is 25.920 MWh, with a CO_2 emissions reduction of 3.500 tonnes per year. These projects have been well covered by the media, because they directly benefit citizen, local businesses, agricultural producers, and the wider community by providing a cleaner and more sustainable heating source.

Furthermore, projects addressing preparation of technical documentation set the foundation for future investment in large-scale geothermal energy exploitation.

Generally, the key impact of the Programme on project partners on includes:

- Strengthened Technical and Institutional Capacities;
- Enhanced Cross-Border Cooperation.

The Project Promoters and their partners including public institutions, municipalities, educational organizations, and energy agencies, experienced significant gains in technical knowledge and organizational capacity. Additionally, they significantly improved their technical skills and institutional know-how through practical implementation and training. Through their involvement in the Programme, many partners strengthened their ability to plan, manage, and implement complex renewable energy projects. For example, partnerships with donor entities from Norway and Iceland enabled Croatian partners to adopt international best practices in geothermal heating, solar systems, and energy management fields. These collaborations provided Croatian partners with access to advanced technical know-how and practical models for implementing geothermal, solar, and sea-based energy systems.

A total of 23 out of 38 projects (63%) included partnerships with donor state entities, leading to substantial bilateral cooperation. The projects involved 77 joint events such as study visits, workshops, and knowledge-sharing sessions, which helped project teams align on technical methods and legal frameworks. These activities strengthened mutual trust and laid the foundation for continued cooperation.

Through study visits, joint workshops, and hands-on project activities, Croatian partners learned how to apply international best practices within their local context. In some cases, this exchange of knowledge has inspired new initiatives, such as the development of a Centre of Excellence for Geothermal Energy in the City of Bjelovar. Several local governments also began integrating renewable energy planning into their long-term strategies.

In addition, project partners improved their ability to coordinate across departments and with external stakeholders, which will benefit them in future programmes and national policy implementation.

The key impact of the Programme on the final beneficiaries includes:

- Improved Access to Renewable Energy;
- Raised Awareness and Knowledge Transfer;
- Economic and Social Benefits;
- Environmental Gains.

Final beneficiaries, through implementing RES projects (e.g. geothermal heating, solar rooftops, and seawater heat pumps) benefit from clean, low-emission energy systems that reduce reliance on fossil fuels and lower energy bills for end users.

As the part of the Programme, over 200 public workshops, school events, and community awareness campaigns were conducted across Croatia. These activities educated thousands of people on the benefits of renewable energy. For example, the Good Energy project in Istria County reached a wide audience with its campaign on solar energy and organized 19 workshops for schools, municipalities, and the general public.

By encouraging local entrepreneurship and the participation of private sector stakeholders, the Programme helped create new job opportunities and fostered green economic development. The Programme's investments supported infrastructure that will continue to deliver savings and employment benefits.

The deployment of renewable energy technologies resulted in substantial CO_2 emission reduction - more than 149.000 tons per year. These outcomes contribute directly to Croatia's national energy and climate goals, while also improving air quality and reducing environmental risks for citizens.

The capacities developed, partnerships formed, and systems installed during the Programme will have lasting effects. Project Promoters and beneficiaries are now better equipped to engage in future renewable energy investments, and numerous initiatives are expected to expand beyond the initial scope. Moreover, the Programme has helped embed renewable energy and sustainability into the planning culture of municipalities and institutions throughout Croatia.

The Programme has significantly contributed to improving the quality of life of target groups and final beneficiaries by enabling access to cleaner energy, lowering environmental impacts, reducing energy costs, and raising awareness about sustainable practices. These improvements have been felt across public institutions, local communities, and among citizens.

The Programme has enhanced quality of life of target groups and final beneficiaries by:

- Improving comfort and conditions in public buildings;
- Lowering energy costs for municipalities and institutions;
- Ensuring cleaner environment and healthier living conditions;
- Increasing energy awareness and education;
- Enhancing energy security and resilience;
- Empowering cities, municipalities and public institutions.

Numerous of the funded projects involved the installation of renewable energy systems which provided more stable indoor temperatures, better air quality, and more reliable heating or cooling. This has particularly benefited schools, kindergartens, healthcare facilities, and public administration offices, where users now enjoy healthier and more comfortable environments.

By replacing outdated and inefficient energy systems with modern, renewable alternatives, local authorities and public institutions have been able to cut their energy bills significantly. These financial savings allow them to spend more of their budgets on

the essential services, such as education, health, and community initiatives, which contributes to an overall improvement in the services that citizens rely on.

The Programme has had a direct positive environmental impact by replacing fossil-fuel-based systems with clean energy technologies. The reduction of CO_2 emissions (approximately 150.000 tons annually) has contributed to better air quality, particularly in urban and industrial areas. Improved environmental conditions support public health, reduce respiratory issues, and enhance the overall well-being of local populations.

Public awareness activities and educational programmes organized under the Programme helped citizens to better understand the importance of energy efficiency and renewable energy sources. Over 200 events and workshops were held, encouraging people to adopt more sustainable habits at home, school, and work. This long-term change in behaviour improves quality of life by promoting more conscious and environmentally responsible communities.

By supporting local energy production through solar and geothermal systems, the Programme helped reduce dependence on imported energy and increased the energy resilience of communities. Beneficiaries now have access to more reliable and locally controlled energy sources, which contributes to long-term energy security and economic stability.

The Programme gave public authorities and institutions the opportunity to take ownership of local energy solutions, involving them directly in project planning and implementation. This active participation helped build institutional confidence and strengthened the capacity of local authorities to manage infrastructure and services, resulting in stronger, more resilient communities.

EQ12: To what extent are the expected benefits from the programme likely to be sustained in the five years after the end of the programme?

The benefits generated by the Programme are highly likely to be sustained over the next five years following the end of the Programme. In many cases, these benefits are expected not only to continue but to expand, as the Programme laid a strong foundation for long-term energy transition at the local level.

The expected sustained benefits from the Programme include:

- Long-term functionality of installed infrastructure;
- Ongoing financial savings for public authorities and institutions;
- Economic benefits for involved communities;
- Lasting knowledge and skills among stakeholders;
- Integration into local development and energy plans and strategies;
- Community awareness and public support;
- Supportive national policies and funding opportunities.

Most of the Programme funding was used to implement permanent infrastructure projects, such as photovoltaic systems, geothermal heating networks, and seawater heat pumps, which are designed to operate over the long term, typically 15 to 25 years or

more. As a result, they will continue to provide clean energy, reduce emissions, and generate savings for public institutions well beyond the Programme formal completion. The long operational life of these systems ensures that the physical benefits of the Programme will be sustained for many years.

By switching to renewable energy sources, numerous public authorities and municipalities institutions are significantly reduced their energy costs. These savings will continue to accumulate over time and can be reinvested in other services. This ongoing financial benefit improves the long-term viability of public services and contributes to overall community development.

The economic benefits are self-sustaining and will generate enough revenue to support future activities such as creating jobs, fostering local entrepreneurship, and ensuring that resources are used efficiently and profitably.

The Programme placed a strong emphasis on training, education, and capacity-building. As a result, numerous stakeholders, including local authorities and public sector employees, have gained valuable skills and knowledge related to renewable energy and systems installed and enable these individuals to take part in future energy projects with greater competence. For example, National Training Centre for nZEB featuring an eight-module curriculum for professionals as well as a replicable framework for nZEB renovations and ongoing educational activities, will ensure the long-term sustainability and promotion of nZEB principles.

Thanks to the Programme, various involved cities and municipalities have started to integrate renewable energy planning into their long-term development and energy plans and strategies. In some cases, project results are being used as models for wider adoption in other municipalities. The creation of geothermal databases and feasibility studies will also support future investments and policymaking. This strategic alignment increases the likelihood that the results will not only be sustained but also expanded in the coming years.

Public campaigns and awareness-raising events carried out during the Programme helped to educate and engage local communities. As a result, people now have a better understanding of the benefits of clean energy and are more likely to support or participate in similar initiatives. This growing public awareness is a key factor in maintaining the systems installed and encouraging further sustainable behaviour in the future.

The Programme objectives are fully aligned with the National energy and climate action plan as well as with the other relevant Croatian energy and climate strategies and legislative acts. Due to this alignment, further support, both political and financial, is more likely to be available in the coming years, which increases the chances that the Programme outcomes will continue to be supported, replicated, and scaled up.

BILATERAL COOPERATION

EQ13: How and to what extent do bilateral partnerships (at programme and project level) add value to programme implementation and results, programme operator, donor Programme partner, project promoters and donor project partners?

Bilateral partnerships at both the Programme and project levels significantly added value to the implementation and results of the Programme, as well as to the institutions involved: the Programme Operator, the Programme Partner, the Donor Programme Partners, the Project Promoters, and the Donor Project Partners. These partnerships fostered mutual learning, innovation, technical cooperation, and long-term collaboration, all of which enhanced the effectiveness and sustainability of the Programme.

Bilateral partnerships played a key role in raising the overall quality and innovation level of the Programme. Donor Project Partners brought in expertise from advanced energy systems and offered practical models that Croatian partners were able to adapt to their local needs. This led to the introduction of new technologies, improved methodologies, and better planning frameworks, particularly in geothermal energy, solar integration, and energy management.

The Programme fostered international and local partnerships, by supporting 37 contracted projects, out of which 23 projects (over 63%) involved cooperation with the Donor project partners from Norway and Iceland. Specifically, 10 projects engaged Icelandic, while 13 projects collaborated with Norwegian partners. As a result of bilateral cooperation, 77 joint workshops, roundtable discussions and study trips were successfully organized.

Three conducted study visits to Norway enabled knowledge exchange and integration of best practices into training materials for improved implementation of nZEB standards.

Bilateral cooperation supported institutional development and professional growth of the Programme Operator. By working closely with the Donor Programme Partners, the PO has learned from their experience in managing similar programmes, which helped improve internal processes related to monitoring, evaluation, reporting, and communication. Study visits and joint events allowed PO staff to observe successful practices and strengthen international relationships, which will benefit future programming and strategic planning.

On the other hand, the Donor Programme Partners also gained value from their involvement in the Programme. By contributing their knowledge and participating in the implementation of projects in Croatia, they were able to share their national models and technologies in a new setting. These partnerships allowed them to extend their international engagement, better understand national and local energy needs, and identify potential areas for future cooperation. They also had the opportunity to

showcase the effectiveness of their sustainable energy solutions in a European Union context.

The Project Promoters benefited directly from bilateral cooperation, which gave them access to specialized expertise, helping them address technical and organizational challenges more effectively. The Donor Project Partners provided support in planning, implementation, and problem-solving. As a result, Croatian partners developed new skills, improved their institutional capacity, and built confidence in managing energy-related projects. All of them are now better prepared to lead future clean energy-oriented investments.

The Donor Project Partners also benefited from the cooperation, because they had the opportunity to test and adapt their technologies and practices in a different regulatory and climatic environment. This collaboration allowed them to expand their knowledge, understand local energy systems in Croatia, and strengthen their ability to operate internationally. The partnerships also created opportunities for new research, pilot projects, and continued professional exchange.

A major strength of these bilateral partnerships is their potential to continue beyond the life of the Programme. Many Croatian and donor organizations have expressed interest in ongoing cooperation, particularly in areas such as geothermal development, smart city solutions, and clean energy technologies. Some institutions are exploring the creation of centres of excellence or planning future applications for joint EU funding. This lasting collaboration shows that bilateral partnerships have not only helped during Programme implementation but also laid the foundation for continued joint efforts in the future.

EQ14: In what ways could bilateral cooperation be further improved?

Based on conducted interviews and field visits, as well as on the analyses of the Programme official documentation, the identified ways to improve bilateral cooperation are as follows:

- Initiate partnerships earlier in the process;
- Provide better support for finding partners;
- Promote long-term cooperation;
- Allocate specific funds for bilateral activities;
- Improve communication and cultural understanding;
- Enhance the role of the Donor Programme Partners;
- Promote and share successful examples.

One way to improve bilateral cooperation is to involve Donor Project Partners earlier in the project cycle, ideally during the planning and proposal development phase. When partners collaborate from the beginning, they can jointly define goals, divide responsibilities more clearly, and align their expectations. This early engagement leads to stronger project design and deeper cooperation throughout implementation.

Some Project Promoters reported difficulty in identifying suitable Donor Project Partner. To address this, the Programme could offer structured matchmaking support, such as

online partner search tools, thematic networking events, or pre-application bilateral workshops. These tools would help connect Croatian institutions with compatible partners from donor countries and encourage the formation of high-quality partnerships.

In many cases, bilateral cooperation focused only on the immediate needs of the project. However, the value of these partnerships could be greater if they were designed to continue beyond the Programme duration. To encourage this, future Programme could support activities like joint research, student or staff exchanges, or follow-up project development. Such efforts would help transform short-term collaboration into lasting institutional relationships.

Working across countries can lead to misunderstandings due to differences in communication styles or institutional cultures. To improve this, future Programme could offer introductory sessions or cultural awareness training to help teams work more effectively together. Regular virtual meetings and shared planning tools could also strengthen coordination and trust between partners.

Donor Programme Partners already played an important role in coordination, but their involvement could be expanded further. They could contribute by offering technical guidance, thematic workshops, or mentoring for the Project Promoters. Their experience and knowledge would help ensure that bilateral partnerships are effective and aligned with best practices from donor countries.

To inspire future partnerships, it is helpful to share the experiences of successful projects. The Programme could produce case studies, video interviews, or summaries of achievements that show how bilateral cooperation improved project outcomes. These materials could be shared during closing events or used to promote future Calls for proposals.

Key findings and recommendations

Key findings

The Clean Energy Transition, which European Union has strongly committed to, and which positively impacts social policy and society, presents a significant challenge for research and development of new technologies in buildings, industry, entrepreneurship, and digitalization within the energy sector. It is a dynamic process that involves wide range of actions from developing energy infrastructure, enhancing the connectivity of network infrastructures with neighbouring countries, fostering regional cooperation, to enhancing independent energy market development.

The Republic of Croatia has taken proactive measures, particularly through its key strategic documents, including the Energy Development Strategy of the Republic of Croatia until 2030, with an outlook to 2050 and the Integrated Energy and Climate Plan for the period 2021–2030, which provide a framework for future clean energy-oriented actions and offer a comprehensive overview of the energy system and the current status of energy and climate policy. The strategy clearly outlines the key objectives in the

energy sector, while the plan includes a detailed overview of national energy goals, one of which is 42.5 % energy from RES in the gross final energy consumption by 2030.

The implementation of the Programme Energy and Climate change has represented significant steps in accelerating Croatian clean energy transition and setting a strong foundation for the broader adoption of best practice in implementing RES and nZEB projects.

The key findings of the Programme implementation include:

- **Alignment with relevant national and EU strategies;**
- **Successful achievement of the Programme objectives;**
- **Significant impact of both Programme outcomes;**
- **Significant added value to RES development;**
- **Strong capacity building and knowledge transfer;**
- **Successful bilateral cooperation with donor countries;**
- **Widespread geographical distribution;**
- **Efficient and adaptive Programme management;**
- **Administrative and regulatory challenges;**
- **Sustainable long-term impact.**

The Programme fully aligns with the Croatian key national strategic acts, such as the Energy Development Strategy of the Republic of Croatia until 2030, with an outlook to 2050 and the Integrated Energy and Climate Plan for the period 2021–2030.

The Programme significantly contributes to Croatia clean energy transition targets through substantial investments in RES and nZEB projects. With a total eligible expenditure of 20 million €, of which 17 million € was financed by the EEA Grants and 3 million € by national co-financing, the Programme achieved a high implementation rate of 99.41%. 38 supported projects were successfully implemented, with 12 projects extended their implementation periods to complete their activities and fully achieve project results and indicators. The project Sun over Vukovar was not fully completed due to delays in grid connection approvals which postponed the operationalisation of the installed systems and shall be finished by June 2025.

An impact on both Programme outcomes: 1. Improved Energy Efficiency and 2. Increased Renewable Energy Production is significant. Under Outcome 1, the predefined project Establishment of a National Training Centre for nZEB resulted in: 1. a deep renovation of the EIHP office building to nZEB standards, including the replacement of the HVAC system, lighting, and building automation systems, as well as the installation of a photovoltaic system and 2. an establishment of a fully operational National training centre for nZEB. The project trained 67 professionals, surpassing the target of 50, with all participants receiving certificates and surveys showing a 96.4% self-reported

improvement in knowledge. The nZEB Centre continues to operate within the EIHP, providing long-term educational infrastructure.

Under Outcome 2, the Programme funded 37 RES projects across solar, geothermal, and sea energy fields, which collectively installed:

- 129,91 MW of geothermal energy capacity;
- 12,16 MW of solar energy capacity;
- 1,95 MW of sea energy capacity.

Achieved results are very significant bearing in mind that according to the Energy Development Strategy, Croatia has the technical capacity potential to use 456 MW of geothermal energy and 2,700 MW of solar energy, which refers to PV systems on buildings.

The Programme resulted in an annual renewable energy production of 470.024 MWh and an estimated reduction in CO_2 emissions of 149.654,37 tonnes. These are significant contributions to the targets of Integrated National Energy and Climate Plan for the period 2021–2030 (NECP) (42,5% RES in total energy consumption). Although the implemented projects provide energy for public users and institutions, for comparison and ease of understanding of the dimension of the investment, this amount of energy produced would cover the electricity supply needs of over 135 thousand households in Croatia. The Programme demonstrates a significant added value to RES development by enhancing decentralized and community-level RES projects and facilitating the use of underutilized solar and geothermal resources, particularly in public infrastructure.

One of the strongest components of the Programme is capacity building and knowledge transfer. It promoted institutional learning and capacity building by supporting 209 workshops, conferences, and educational events as well as cross-sectoral capacity development through extensive collaboration with Norwegian and Icelandic partners. Bilateral partnerships with donor entities from Norway and Iceland were established in 23 out of 38 projects (63%). These collaborations resulted in 77 bilateral activities, including joint workshops, study visits, and roundtable discussions, which significantly enhanced knowledge transfer, innovation, and institutional cooperation.

The geographical reach of the Programme is significant, because projects were implemented in 46 locations across Croatia, including 14 municipalities, 32 cities, and 19 counties. This wide coverage ensured equitable regional development and supported local energy independence, particularly in underdeveloped and rural areas.

An efficient and adaptive Programme management enables a high implementation rate despite numerous challenges such as COVID-19, inflation, supply chain disruptions, and complex permitting processes. Twelve projects utilized flexibility measures to complete their activities, and a restricted call for additional funding allowed four infrastructure-heavy projects to continue successfully, using unspent Programme savings.

The recognised common obstacles include public procurement complexity, permit delays, limited administrative capacity of some Project Promoters and regulatory burdens.

Several projects faced delays due to complex public procurement procedures, difficulties in obtaining permits, regulatory changes, and limited administrative capacity, which increased the workload for Project Promoters and, in some cases, led to modifications or partial implementation of project activities.

The sustainability of the Programme results and outputs is justified by:

- Long-term operation of installed infrastructure - geothermal and solar installations, and heat pump systems are expected to operate for 15 to 25 years;
- The ongoing operation of the nZEB Training Centre;
- An interactive geothermal database accessed by over 350 registered users;
- The associated savings in energy costs for public institutions;
- Enhanced institutional capacities of Project Promoters;
- Increased public awareness on clean energy topics.

Recommendations

The recommendations to improve the Programme in the next financial perspective 2021-2028 are as follows:

- Strengthen local capacities and technical support;
- Introduce real-time monitoring tool;
- Encourage broader replication and visibility of results;
- Ensure projects are strategically aligned with local and national goals;
- Streamline regulatory and permitting procedures;
- Ensure financial resilience and planning;
- Expand and institutionalize the nZEB training centre;
- Strengthen bilateral and international cooperation;
- Focus future investments on innovation and emerging technologies;
- Integrate environmental and climate adaptation topics;
- Enhance reporting and data sharing;
- Support capacity-building for public procurement and project management.

Aiming to strengthen local capacities and technical support, capacity building efforts should be expanded, particularly for municipalities and institutions with limited administrative and technical capacity including tailored training programmes and mentorship from experienced Project Promoters.

The Programme should implement real-time monitoring tool that enable both Programme Operator and Project Promoters to track progress, detect issues early, and adjust plans where needed. This tool would enhance Programme transparency and effectiveness.

The Programme should continue supporting the visibility and replication of successful case studies. For example, the National Training Centre for nZEB should serve as a hub for training professionals and promoting renovations that align with EU climate goals.

Case studies and media campaigns should be used to highlight successful projects and engage more communities.

Future calls for proposals should prioritize projects that are already integrated into national, regional, or local development and energy plans. This alignment would ensure quicker permitting, broader institutional support, and a higher likelihood of long-term success.

Streamlining regulatory and permitting procedures are very important. Many projects faced prolonged delays due to slow approval processes for geothermal wells, EV charger installations, and infrastructure changes, often taking up to a year. Future Programme should engage permitting authorities early, simplify administrative procedures, and introduce fast-track options for RES projects to avoid bottlenecks.

Initial budgets for several projects were underestimated, leading to cost overruns and delays. To ensure financial resilience and planning, future Programme should require more detailed financial risk assessments and include contingency reserves (e.g. 10–20% of the project value) to account for inflation, supply chain disruptions, and design adjustments.

The success of the nZEB Centre highlights the importance of continuous professional development in the energy and construction sector. Future Programme should support its curriculum expansion (e.g., to zero-emission standards, Vehicle-to-Grid systems, etc.), regional branches, and integration with vocational education. Awareness campaigns targeting younger audiences and schools, as done in projects like Sun over Vukovar and Solar Roofs for Green Virovitica, should be further scaled.

The high value of bilateral partnerships with donor entities like EFLA, NORCE, and the University of Stavanger should be formalized through memorandums of understanding or joint research initiatives. A proposed Centre of Excellence for Geothermal Energy in the City of Bjelovar would be an ideal vehicle for sustaining and advancing bilateral cooperation.

Scaling up on successfully implemented RES projects future investments should focus on innovation and emerging technologies including:

- Battery storage (e.g. planned 3200 kWh battery system at EIHP);
- Vehicle-to-Grid (V2G) integration;
- Water-to-water heat pumps;
- Hydrogen-ready technologies.

Pilot projects should explore how these innovations can be scaled in Croatia energy system.

Synergies with other EEA Programme Operators (e.g. Portugal, Bulgaria, Poland) could further strengthen project design and impact.

Aiming to enhance Reporting and Data Sharing an interactive platform should be developed.

Difficulties in public procurement were common. The Programme should aim to simplify public procurement procedure by introducing standardized procurement templates. Training in public procurement, budgeting, and reporting should be mandated for all Project Promoters. Additionally, joint procurement model successfully implemented by the Regional Energy Agency North should be replicated.

Integrating presented recommendations in the Programme for the next financial perspective 2021-2028 would mitigate the most influential challenges that Project Promoters faced and would further enhance its significant impact and benefits for accelerating clean energy transition in Croatia.

Annex 1 List of implemented projects

Project title	Project promoter
Open call #1: Energy Production from the Sea	
1. Installation of a seawater heat pump system for the needs of the Dubrovnik City Swimming Pool	City of Dubrovnik
2. Sea for Heritage Energy Transition - SeaHEAT	Special Hospital for Orthopedics and Rehabilitation "Martin Horvat" Rovinj-Rovigno
3. Seawater heat pump system Viktor Lenac	Viktor Lenac company
Open call #2: Increased Solar Energy Production Capacity	
1. Bilateral cooperation to increased production of energy from renewable sources – BC RES	Grad-Export company
2. Solar roofs in the municipalities of Andrijaševci, Stari Jankovci and Privlaka	Municipality of Andrijaševci
3. One Sun Connecting North and South	REA - Sjever
4. Increasing the capacity of educational institutions in Varazdin County for solar energy production	Varaždin county
5. Increasing the capacity for solar energy production on public facilities owned by the City of Split - SuSTainable	City of Split
6. Šibenik-Knin Organization for Local Clean Energy Sources - ŠKOLICE	Technical school Šibenik
7. Solar power plant on Zadar general hospital	Zadar general hospital
8. Solar Roofs for Green Virovitica	City of Virovitica
9. Good energy – solar energy for the energy transition	Istria county
10. Sun over Vukovar - SunNyVuk	City of Vukovar
11. Photovoltaic power plant for self-consumption for ENERGO-TEHNA company	ENERGO-TEHNA company
12. Increasing the use of renewable energy sources in Supernova shopping centers	Supernova Projekti company
13. Solar power plant Kelteks	Kelteks company
14. Solarisation of Karlovac City institutions - SolariKA	City of Karlovac
15. Solarisation of Zagreb City institutions - SOLIZAG	City of Zagreb
16. Increasing the solar energy production capacity of the Bineko company	Bineko company
17. Increasing solar energy production capacity at public facilities in the Municipality of Medulin	Municipality of Medulin
18. Velika Gorica Solar City - COUNTDOWN	City of Velika Gorica

19. Photovoltaic system for the production of electricity for own needs in grid operation SE-FER-005 – Phase 1	Faculty of Electrical Engineering and Computing, University of Zagreb
Open call #3: Increased Geothermal Energy Production Capacity	
1. Use of geothermal energy for heating purposes in the City of Karlovac – PREP4KaGT-1	GeotermiKA company
2. Increasing geothermal energy production capacity - Infrastructure works on the Korenovo GT-1 well	City of Bjelovar
3. Establishment of a geothermal energy production system in the City of Križevci - Krizevcanka-1	City of Križevci
Open call #4: Technical Documentation for Geothermal Energy	
1. Preparation of technical documentation for the research of geothermal water in the area of Batina in the City of Kutina	City of Kutina
2. Clean energy for Vukovar	City of Vukovar
3. Preparation of technical documentation for the utilisation of geothermal energy in the City of Križevci	City of Križevci
4. Preparation of technical documentation for the "Lipik" exploration area	City of Lipik
5. Technical documentation for the direct exploitation of geothermal energy in the City of Sisak	City of Sisak
6. Topusko smart thermal city - TopThermalCity	Topusko Health Resort
7. Hydrothermal potential of Krapinske Toplice	Krapina-Zagorje county
8. Preparation of documentation during the geothermal water research phase in the City of Sveta Nedjelja	City of Sveta Nedjelja
9. Preparation of technical documentation for the use of geothermal energy in the exploitation field of geothermal water Zagreb	GPC instrumentation process company
10. Preparation of technical documentation for the use of geothermal energy in Veliko Korenovo - Korenovo GT-1	City of Bjelovar
Small grant scheme 1: Shallow Geothermal Energy Database	
1. Mapping of shallow geothermal systems in the Republic of Croatia	Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb
Small grant scheme 2: Deep Geothermal Energy Database	
1. Preparation of an interactive map of the geothermal potential of the Pannonian part of the basin in the Republic of Croatia	Croatian Hydrocarbon Agency

Annex 2 List of analysed documents

Programme documents:

- Annual Programme reports for years 2021, 2022 and 2023;
- Final Programme Report (2024-2025)
- Programme Agreement;
- Programme implementation decision,
- Call for Proposals.

Project documents:

- Application Form with accompanying documentation,
- Final project reports, etc.

Annex 3 Biographies of experts

Sectoral expert

Key Expert 1: Vesna Kolega
Vesna Kolega brings three decades of experience in sustainable energy and climate change, gained through roles in public and private sectors. This includes two years at the Croatian Power Utility Institute and 14 years at the Energy Institute Hrvoje Pozar. For eight years, she served at the North-west Croatia Regional Energy Agency and for 9 years as a director and independent consultant at a consultancy firm. Vesna has been instrumental in shaping energy and climate policies, serving on the Croatian negotiation team for EU accession and as a member of the European Council for an Energy Efficient Economy. She has also been a key evaluator for numerous European programmes, including Horizon 2020 and the New European Bauhaus (NEB), and has advised on EU accession processes in Albania With a strong background in coordinating international projects and supporting decision-making processes at various government levels, Vesna has authored numerous legislative documents and policy analyses. Her expertise spans a wide range of programmes, from the World Bank to the European Investment Bank (EIB). Vesna holds a BSc and MSc in Electrical Engineering and Computing from the University of Zagreb. Throughout her career, she has been dedicated to promoting sustainable energy and combating, reflecting her commitment to these critical global issues.
Key Expert 2: Suada Mustajbegović
Suada Mustajbegović holds a master's degree in Natural science and an MBA in the energy sector, with over 25 years of post-graduate experience in sustainable development projects. She has 16 years of specialised expertise in climate change, energy efficiency, and renewable energy sources. Suada has extensive practical experience in Croatia's pre-accession and structural instrument environment, serving in various roles, including Head of Intermediate Body level 2, within the Environmental Protection and Energy Efficiency Fund. She has been instrumental in managing EU funds as part of Croatia's EU-accredited structure. Her responsibilities have included supervising, monitoring, and revising projects, assessing project goals, and preparing monitoring reports. She has also managed stakeholder relationships and dealt with Cohesion Policy preparation and implementation, including planning, programming, major project development. Suada's international experience includes serving as a TAIEX expert in energy efficiency and renewable energy sources, participating in missions and workshops in Armenia, Azerbaijan, Georgia, Israel, Ukraine, and Serbia.

WYG experts

Evaluation expert – Mladen Vojković

Mladen Vojković, Managing Director of WYG, has 15 years of experience in human resources development, public administration reform and regional development and 12 years of experience in monitoring and evaluating projects, programmes and politics. As a team leader and evaluator, he has participated in numerous project and programme evaluations in the fields of employment, institutional development, management, cross-border cooperation, horizontal principles, etc. Mladen was one of the Key Experts in the evaluation of the Operational Program Effective Human Resources 2014 - 2020 (Group 4: Evaluation of Priority Axis 4 "Good governance", Group 6: Evaluation of the effectiveness, efficiency and impact of the implementation of the OPEHR and ESF interventions according to the regional and local representation criteria with evaluations of horizontal principles), and a Team Leader of evaluations of different CBC programmes (Croatia-Slovenia, Croatia-Serbia, Croatia-Bosnia and Herzegovina-Montenegro).

Quality assurance expert – Jelena Kljaić Šebrek

Jelena Kljaić Šebrek, Director of WYG, has more than 15 years of experience in preparing and implementing projects funded by EU funds (IPA programme, Structural Instruments, Union Programmes, Territorial Programmes cooperation, Integrated Territorial Investment). She gained work experience as a manager of many projects in which she coordinated project activities and led project teams. Jelena has been a lecturer for many years in the field of preparation and implementation of projects financed by EU funds. She holds a PhD in quantitative economics. She has extensive experience in project evaluation in the field of research and development, and she has developed evaluation methodologies for many project and programme evaluations. Jelena was one of the experts who participated in the interim evaluation of the Operational Program Effective Human Resources 2014–2020.

Quality assurance expert – Ninon Gautier

Ninon is Head of Monitoring, Evaluation and Research at WYG, with over seven years of experience conducting evaluations and studies. She is a seasoned project manager with a proven track record of designing and applying a broad range of methodologies, including stakeholder consultation, crafting targeted questionnaires, conducting interviews, performing qualitative and quantitative analyses, and quality reviewing deliverables.

Ninon has led several high-profile evaluations, including, most recently, the midterm evaluation of the European Maritime and Fisheries Fund (EMFAF) for the Directorate-General for Maritime Affairs and Fisheries. This role encompassed data collection, in-depth analysis, and reporting, ensuring that all outputs met stringent quality standards.

Ninon's international experience and fluency in French, English, and Spanish and working knowledge of Norwegian, equips her with a nuanced understanding of diverse contexts. Ninon combines linguistic proficiency with deep expertise in quality assurance.

Evaluation expert and project coordinator – Mona Manojlović

Mona Manojlović, a Consultant at WYG with a master's degree in political science, has over four years of experience with the preparation and implementation of projects financed by EU funds. Most of her work focuses on evaluation projects – she participated in five evaluations of the effectiveness, efficiency and impact of the Operational Programme Effective Human Resources 2014-2020, four evaluations of the cross-border cooperation programmes, and numerous evaluations of small-scale projects financed by EU funds. As part of her work, she has focused on documentation and data analysis, collecting and processing quantitative and qualitative data, and providing recommendations based on the analysis. She is also experienced in coordinating teams of experts and managing projects in the domain of evaluations. Most recently, Mona was running an Impact Evaluation of the Cooperation Programme Interreg V-A Slovenia - Croatia 2014-2020.

Evaluation expert and project coordinator – Dario Gašparić

Dario Gašparić holds a master's degree in political science and a certificate in the Development and Management of EU-funded Projects. He has been working as a consultant and project manager at WYG for four years, where he has mostly worked on the preparation and implementation of projects financed by the EU and other organisations. His day-to-day work mostly consists of contacts with contracting authorities, communication with experts, monitoring of contract implementation and reporting. Dario is also experienced in data collection and analysis, and he has also participated in many evaluations in the socio-economic sector. His most recent work includes the Final evaluation of the project Support to Vocational Education and Training Reform in Kosovo (Phase II) and a project evaluation of "Establishment and implementation of systematic energy management and development of a new financing model".