

General information	State Croatia		
	Status EU-Membership	Member State since 1 July 2013 ¹ Schengen: member since 1 January 2023	
	Population	4,047,200 (2020) 3,853.20 (2023) ²	
	Land area (km²)	56,590 km ² (2020) ³	
	Urban population (%)	59 % (2023) ⁴	
Socio-economic situation	GDP (current US\$ billion)	82.69 (2023) ⁵	
	GDP per capita (US\$)	21,500 (estimated, 2023) ⁶	
	Annual net earnings (Single person without children earning 100% of average earning (EURO))	12,330 (2023) ⁷	
	Median hourly earnings (EURO)	Males: 5.54 (2018) Females: 5.15 (2018) ⁸ Hier: Median hourly earnings, all employees (excluding apprentices) by sex	
	World Bank economic classification (2021)	High-income country ⁹	
Unemployment (% of total labor force)	6.1 % (2023) ¹⁰		
Energy situation in general	Current energy sources	<p>The overall energy mix in Croatia in 2021 comes from:</p> <ul style="list-style-type: none"> • Oil 34.6 %, • Natural gas 29.5 % • Biofuels and waste 20.3 % • Hydroelectric power 7.4 % • Hard coal 5.0 % • Renewables 3.1 %, mainly wind and solar. 	
		<p>Domestically produced energy in 2021:</p> <ul style="list-style-type: none"> • Biofuels and waste were the most relevant sources of energy at 46 % • Followed by crude oil 16 % • Natural gas 15.5 %, hydro • and wind & solar 15.6 %, and 6.5 % respectively. <p>In 2022, Croatia imported 60 % of its energy supply¹¹. The country shares also ownership of the Krsko nuclear reactor in Slovenia, which is considered as imported electricity for the energy mix.</p> <p>Croatia's electricity mix in 2023 included different types of resources as detailed below – in parenthesis is data for 2022:</p> <ul style="list-style-type: none"> • Hydropower accounts for 38 % (46.5 %) • Followed by gas at 25 % (22 %) • Coal at 11 % (8 %) • Wind at 16 % (15 %) • Bioenergy at 6.5 % (6.5 %) • Solar and other fossil fuels each at 1 % (1 %). 	

Croatia mainly exchanged its electricity in 2021 with Slovenia and Bosnia and Herzegovina. The Croatian electricity system has 21 interconnectors with B&H and 9 with Slovenia. Interconnectors exist also with other countries such as Hungary and Serbia.

In terms of final energy consumption, residential uses are the largest contributor at approximately 30 %, followed by transport accounting for also around 30 % and lastly industry which takes about 16 %.

In the first half of 2023, solar power capacity rose from 224 MW to 306 MW. Yet, Croatia had one of the lowest photovoltaic capacities per capita in Europe. Geothermal energy also holds promise, with six active projects in central and eastern Croatia, regions with a geothermal gradient three times higher than the European average. Croatia also developed an LNG terminal on the island of Krk and replaced 60 % of the gas previously supplied by Russia's Gazprom. By 2025, Croatia wants to double its capacity and infrastructure to send LNG abroad to other countries.^{12 13 14}

Climate protection targets

Croatia is committed to decarbonization by significantly reducing greenhouse gas (GHG) emissions and increasing the use of renewable energy sources (RES).

Croatia is also a member of the European Union; hence it has to in line with global policies like UN Sustainable Development Agenda as well as Paris Agreement that was signed in 2017.

- Croatia wants to cut its GHG emissions by at least 55% below 1990 levels by 2030; as the EU policy needs.
- The latest EU ETS reform has set a new target for 2030 with emissions reduced by 62 % in comparison to 2005. The annual reduction rates should be:
 - 4.3 % from 2024 to 2027
 - 4.4 % from 2028 to 2030
- For areas outside ETS - like road transport small energy plants, homes, and farms - the country shoots for a 30 % cut, with a specific 7 % drop.
- The country aims also for a net removal of -593 ktCO₂ in land use and forestry by 2030.

As a remedy for the impact of climate change, Croatia has put together the Climate Change Adaptation Strategy¹⁵ that includes lowering the climate-resilience vulnerability of the people to the climate impact, increasing the recovery capacity, and using the potential positive effects to their good. The listed strategy is a part of the National Development Strategy until the year 2030, which is mainly concerned with the environmental and energy transitions for climate neutrality. The Development Strategy until 2030, with a view to 2050, will be used to lessen GHG emissions, raise energy security, and boost resource efficiency not only in the energy sector, but also in industry, transportation, agriculture, forestry, and waste management.

In the building sector, Croatia targets an 80 % reduction in CO₂ emissions by 2050.

The transport sector focuses on promoting electric and hydrogen vehicles and establishing alternative fuel infrastructure.

Agriculture encourages low-emission production and improved agrotechnology.

While forestry manages 49.3 % of Croatia's land as carbon sinks, contributing to 23.7 % of national emissions reduction. ¹⁶

Renewable energy targets

By 2030, Croatia aims to significantly increase its use of renewable energy sources (RES) across various sectors by setting these targets:

- Overall Renewable Energy Share 2021 vs 2030 targets:
 - 2021: 31.7 %
 - 2030 Target: 42.5 %
 - Electricity Sector:
 - 2021: 53.5 % renewable energy
 - 2030 Target: 73.6 % renewable energy
 - RES Electricity Consumption:
 - 2021: 10.8 TWh
 - 2030 Target: 16.1 TWh
 - Key Growth RES Areas:
 - Wind Energy:
 - 2021: 2.1 TWh
 - 2030 Target: 6.2 TWh
 - Solar PV:
 - 2021: 149 GWh
 - 2030 Target: 1 TWh
 - Hydropower:
 - 2021: 6.6 TWh
 - 2030 Target: 6.5 TWh
 - Heating and Cooling Sector:
 - 2021: 38.0 % renewable energy
 - 2030 Target: 47.1 % renewable energy
 - Gross Final RES Consumption:
 - 2021: 14.9 TWh
 - 2030 Target: 16.4 TWh
 - Significant Increases:
 - Solar Energy
 - Solid Biomass
 - Geothermal Energy
 - Hydrogen:
 - 2021: No contribution
 - 2030 Target: 617 GWh
 - Transport Sector:
 - 2021: 7.1 % renewable energy
 - 2030 Target: 21.6 % renewable energy
 - RES Consumption:
 - 2021: 1.2 TWh
 - 2030 Target: 1.5 TWh
 - Electricity from RES:
-

- 2021: 142 GWh
- 2030 Target: 469 GWh

To support these targets, Croatia plans significant expansions in power plant capacities. The targeted total capacity is expected to be:

- 2021: 5.2 GW
- 2030: 7.8 GW
- 2050: 18.4 GW
 - wind power reaching 8.5 GW
 - solar power achieving 3.2 GW.

Solar power is a key focus, with about 60% of the planned solar power plants expected to be roof-installed for self-supply. The total quota for all solar power plants is set at 1,075 MW. Hydropower remains crucial, with a current capacity of around 2,200 MW, including large, small, and pumped-storage plants.

Regulatory measures support these ambitious targets. The Regulation on quotas for encouraging RES production and the New Council Regulation (EU) 2022/2577 aim to accelerate RES projects, particularly small integrated solar projects. The Clean Energy for EU Islands Declaration underscores the importance of energy transition on islands, promoting self-supply and innovative clean energy solutions.¹⁷

Renewable energy potential

Croatia's Renewable Energy Potential:

- Offshore Wind Capacity in Croatia:
 - Identified Potential: Up to 25 GW in the Adriatic Sea
 - Development Areas: Over 29,000 km² of offshore zones suitable for wind and photovoltaic power plants

This could significantly transform Croatia's renewable energy landscape, potentially surpassing current onshore capacity and aligning with Europe's offshore wind goals. Implications with the natural habitat and species are to be closely considered. The expansion of offshore renewables could boost the national economy, particularly through the involvement of the shipbuilding industry. Further steps include developing a national maritime spatial plan, simplifying regulatory processes, and engaging with local stakeholders.

- Agrisolar (Agrivoltaic) Potential in Croatia:
 - Annual Electricity Generation: 1,000 GWh of green electricity, covering over 6% of Croatia's electricity consumption on 1 % of farming land.
 - EU Adoption: Croatia is one of ten EU countries adopting agrisolar technology.
-

This multi-use approach brings added benefits in croplands and in fish farming. Additionally, there is an exploration of floating solar power plants in freshwater aquaculture. Simplified regulatory frameworks facilitate agrisolar development, removing the need for public calls for energy approvals. Continuous monitoring systems should ensure environmental impacts (on soil and microclimate) are managed effectively.

18 19

Renewable energy support regime

Croatia is advancing its RES sector with a comprehensive support regime designed to modernize and expand its electricity system. The country aims to efficiently integrate increasing amounts of electricity from RES while ensuring stability and security. Central to this effort are:

Electricity Grid Modernization:

- Efficiently integrate increasing amounts of electricity from RES.
- Ensure stability and security within the electricity system.
- Modernization and digitization of the electricity grid.
- Significant investments to enhance powerline infrastructure and storage capabilities.
- High-voltage grid improvements of EUR 213 million earmarked for enhancements.
- Transmission System Operator (CTSO / HOPS) plans to invest EUR 667 million by 2026.
- Distribution System Operator (HEP-DSO) plans to invest EUR 1.27 billion over the next decade.
 - Focus on modernizing the distribution system, installing smart meters, and enhancing connectivity within Croatia and to other EU countries and islands.
- Grid Modernization for Renewable Energy:
 - \$1.4 billion investment aimed at improving connections between renewable energy sources.

Energy Efficiency and Security:

- Revitalizing powerlines and connecting new renewable energy production capacities.
- Preparing for extreme weather risks linked to climate change.
- Maintaining high-security standards to prevent cyberattacks.

Heating Sector Upgrades:

- District Heating System Improvements:
 - Focus on boosting energy efficiency and reducing heat losses.
 - Replacing outdated fuel oil boilers with biomass boilers and heat pumps.
-

- Installing high-efficiency cogeneration units utilizing RES such as geothermal energy.
- Decarbonization:
 - Integrating renewable energy sources into the heating grid.

Funding Sources:

- EU Funds: Including the Modernisation Fund and the Operational Programme Competitiveness and Cohesion (OPCC).
- National Recovery and Resilience Plan:
 - Secured EUR 29 million for geothermal projects.
 - EUR 1.4 billion specifically allocated for the energy sector.

Research and Development:

- Foster adoption of renewable energy technologies.
- Mapping waste heat sources.
- Conducting feasibility studies for using waste heat in centralized heating systems.
- Exploring the potential for cooling via absorption heat pumps.²⁰

Croatia is also focused on making it easier to get permits for investments and integrating wind, solar, geothermal, and bioenergy into the national grid. Integrated solar power plants on rooftops and near buildings, as well as large hydropower plants, can play a crucial role in increasing renewable energy's share in the total energy mix.²¹

The Croatian government, through the Ministry of Environment and Sustainable Development (MESD), is endorsing energy sharing and the formation of energy communities to boost the use of RES as detailed in the draft National Energy and Climate Plan 2023. Support for energy communities includes:

- Capacity Building: Empowering communities to effectively participate in the energy sector.
- Co-Financing: Financial support for implementing RES technologies.
- Simplified Procedures: Streamlining administrative processes to facilitate the establishment and operation of energy communities.
- Funding Sources:
 - Budgetary Resources.
 - Cohesion Fund.
 - Modernization Fund.
 - Recovery and Resilience Plan.
 - Other Financial Mechanisms.

Key legislative and regulatory updates are being overseen by MESD, the Croatian Energy Regulatory Agency (CERA), and Distribution

System Operators (DSOs). These include updating electricity network access rules, enhancing information exchange procedures, and ensuring non-discriminatory grid access.

The effectiveness of these measures will be monitored by MESD and CERA, focusing on the number of established energy communities and installed RES capacities.²²

Relevant laws, policies, and plans

- **Energy Act** (OG 120/12, 14/14, 95/15, 102/15, 68/18) - The Energy Act governs the energy sector in Croatia and declares the use of RES as a national interest. To support this, **the Ordinance on permits for performing energy activities** (OG 44/22) was established, recognizing new activities such as energy aggregation and storage. Additionally, a **system of guarantees of energy origin** was elaborated by **Regulation** (OG 28/23), extending the forms of energy for which CEMO (Croatian Energy Market Operator – state-owned company) issues guarantees, thus promoting transparency and credibility in renewable energy use.
- **the Electricity Market Act** (OG 121/21) - The Electricity Market Act in Croatia transposes Directive (EU) 2019/944 and includes methodologies for tariffs and fees. It establishes the **Ordinance on general conditions for network use** (OG 100/22), the Methodology for connection fees (OG 84/22), and the Rules on supplier and aggregator changes (OG 84/22). Additionally, it ensures high electricity supply standards through the **Ordinance on electricity supply quality** (OG 84/22) and promotes market efficiency with CEMO's rules on wholesale market organization.
- **the Thermal Energy Market Act** (OG 80/13 and 14/14)
- **the Renewable Energy Sources and High-Efficiency Cogeneration Act** (OG 138/2021) **Law on Renewable Energy** - encourages the use of renewable energy and high-efficiency cogeneration. It includes the Regulation on the Share in Net Supplied Electricity (OG 156/22), the Regulation on the Use of Renewable Energy Sources and High-Efficiency Cogeneration (OG 28/33), the Decision on the Fee for Renewable Energy Sources (OG 31/23), and the Regulation on the Criteria for Payment of Reduced Fee (OG 31/23). from January 2016 has a positive transformation (i.e., net metering scheme).
- **The Biofuels for Transport Act** (OG 145/10, 26/11, 144/12, 14/14, 94/18 and 52/21) regulates the use of RES in transport.
- **Spatial Planning Act** (OG 153/13, 65/17, 114/18, 39/1, 98/19) - Relevant for spatial planning and construction of RES projects.
- **Construction Act** (OG 153/13, 20/17, 39/19, 125/19) - construction regulations related to RES projects.
- **Environmental Protection Act** (OG 80/13, 153/13, 78/15, 12/18, 118/18) - crucial for environmental impact assessments.
- **Nature Protection Act** (OG 80/13, 15/18, 14/19, 127/19) - Crucial for nature impact assessments.
- **Water Act** (OG 66/19, 84/21) - provides for permits for floating solar power plants on public water surfaces, regulated by the **Ordinance on the Issuance of Water Rights Acts** (OG 9/20).
- **The Energy Development Strategy** of the Republic of Croatia until 2030 with an outlook to 2050.²³
- **National Low-carbon Strategy: 2030 and outlook to 2050**; developed in 2017; "It underlines the importance of active citizen involvement and the development of innovative financing models for locally initiated RE projects."²⁴
- **National Development Strategy 2030** which is an action plan for 2018 to 2030 aims to support the dual digital and green transitions of Croatia²⁵
- **Climate Change Adaptation Strategy** in the Republic of Croatia for the period until 2040 with a view to 2070.²⁶

Regulatory framework for citizen energy

Croatia has established legal provisions for Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs). These are included in the Law on Renewable Energy Sources and Highly Efficient Cogeneration and the Law on the Electricity Market, respectively. Additional regulations can be found in the Rulebook on General Conditions for Network Use and Electricity Supply and the Rulebook on Permits for Energy Activities.

The Croatian Energy Regulatory Agency has the task of adopting the Rulebook on general conditions for network use and electricity supply. This Rulebook outlines the contractual relationships between energy entities and network users, covering aspects such as network use, electricity supply, aggregation, flexibility services, and energy sharing. Key definitions include users of metering data, existing and new energy communities, and electricity-sharing schemes within these communities.

The Rulebook provides guidelines on participation in community energy, clearly defining the associated rights and obligations. Similarly, the termination of a participation contract in community energy should be clearly defined and published on the community energy's website. The participation in community energy has to be transparent in terms of payment, contracting, and calculating services according to the electricity market law. It also outlines the duties of state agencies, including their responsibility to monitor and eliminate unfair barriers or discriminatory conditions to electricity production by energy communities. The Rulebook was adopted in August 2022.

Renewable Energy Communities (RECs): are legal entities with open, voluntary participation and autonomous control by members near renewable energy projects. Members include individuals, SMEs, and local/regional authorities. It aims to provide environmental, economic, or social benefits, not financial profit.

Citizen Energy Communities (CECs): are legal entities based on voluntary, open participation and control by members. Members include individuals, local authorities, or small businesses. Engage in various energy activities, including renewable energy production, energy supply, and electric vehicle charging. Regulated by the Law on the Electricity Market and must be registered with the Croatian Energy Regulatory Agency.

RECs (rights and obligations): Right to produce, consume, store, and sell renewable energy. Can share renewable energy within the community. Access to energy markets directly or through aggregation.

CECs (rights and obligations): Participate in electricity production, supply, consumption management, aggregation, and energy services. Operate under non-discriminatory and proportionate rules for all electricity markets.

RECs and CECs (administrative and legal requirements): RECs and CECs must register with the Croatian Energy Regulatory Agency. Must comply with national laws on financial operations and non-profit organization accounting.

Obligations of Distribution System Operator (DSO): Deliver and calculate electricity data as per sharing schemes. Enter into agreements with energy communities for data exchange and mutual relations.²⁷

Evaluation of the legal framework (rather enabling, neutral, rather hindering)

- Croatia has integrated provisions for RECs and CECs into its national legislation and established rules for their registration. However, the government has not yet assessed the barriers or potential for REC development, nor detailed the specific elements of an enabling framework. Some legal provisions, especially those related to geographic restrictions, membership, and the registration and licensing process, are excessively hard, creating significant obstacles for energy communities. Additionally, no support schemes have been designed, and despite some development of energy-sharing rules, there are no incentives, making energy communities currently unfeasible.
- The Croatian government is required by national law to assess obstacles and potentials for developing renewable energy communities (RECs), but this has not yet been done. The Energy Law imposes significant barriers, including geographic restrictions and complex registration procedures, making it difficult to establish energy communities. Distribution System Operators (DSOs) are required to facilitate energy sharing and validate production data. However, the regulatory framework is unclear, with high costs and extensive requirements for licensing.
- Additionally, no special incentives, support schemes, or tools for finance and information access have been developed, and the needs of low-income and vulnerable households are not addressed. The government plans to include elements of the enabling framework in NECP progress reports, but concrete measures are still missing.²⁸ The public consultation for the NECP was ineffective, giving civil society and other stakeholders insufficient time to provide detailed comments and feedback.²⁹

Existing citizen energy projects and/or research initiatives

Citizen energy projects

KRIŽEVCI SOLAR ROOFS / "Sunčani krovovi"

Overview:

- The Križevci Solar Roofs project, initiated by the Green Energy Cooperative (ZEZ) and the City of Križevci, is Croatia's first community energy initiative and crowd-investing venture.
- Launched in 2018 and 2019, it funded two 30 kW solar power plants on public buildings through citizen microloans. Investors were repaid over 10 years with interest. These projects not only cover the buildings' electricity needs but also positioned Križevci as a pioneer in community-driven renewable energy.
- The success led to the establishment of KLIK, managing the city's Energy and Climate Office.³⁰

KLIK: Laboratory for Climate Innovation in Križevci

Overview:

- Established in 2020 by twelve citizens, KLIK serves as an information hub for energy and climate issues, winning the European Sustainable Energy award in 2023.
-

- Originating from the successful "Sunčani krovovi" project, KLIK supports renewable energy projects, offering training and showcasing green technologies.
- It recently launched the "crOss renoHome" project to guide citizens in energy redevelopments. KLIK works independently but collaborates with Križevci municipality, advocating for better regulations and developing a new photovoltaic power plant project.³¹

Otok Krk

Overview:

- Croatia's first energy cooperative was founded in 2012 on the island of Krk.³² Provides assistance and support to residents interested in producing green energy. "Cooperative members – Krk town, all municipalities, NGOs, citizens; 300 members interested to join with first projects funded"³³.
- "Ostrvo Krk Energy (a firm founded by the island) has developed a solar power plant with an installed capacity of 5 MW and offered local residents and businesses to become co-owners. The solar panels were installed on about 10 public buildings."^{34 35}

Research and capacity building activities

LIFE LOOP project - The LIFE LOOP project, spearheaded by ZEZ, aims to unite local governments, citizens, and SMEs to advance solar energy efficiency and community involvement. This three-year initiative focuses on creating energy communities in pilot areas like Zagreb (Croatia), Crete (Greece), and Bistrita (Romania), with plans for replication in other regions. Supported by various European energy cooperatives and local authorities, the project fosters collaboration and energy justice, empowering citizens to drive local energy transitions. Funded by the EU's LIFE program, LIFE LOOP is dedicated to building sustainable and equitable energy solutions across Europe.³⁶

COMPILE project - The project concluded on October 31, 2022, achieving significant milestones across five pilot sites in Slovenia, Spain, Croatia, Portugal, and Greece. For Croatia, key accomplishments include the installation of PV systems in Križevci, and the development of four technical tools and two support tools, such as GridRule and COOLkit. The project produced 51 deliverables and hosted over 120 events. It also created the Maturity Scale Framework to support energy community leaders and disseminated materials like brochures and videos. The initiative was funded by Horizon 2020.³⁷

Access to Capital for Community Energy (ACCE) project - The ACCE project aims to develop and scale Community Energy Financing Schemes (CEFS) across Europe, addressing financial barriers for energy communities. It plans to establish five new CEFS in Belgium, Germany, Croatia, Romania, and Spain, expand existing ones in the Netherlands and France, and set up a European intermediary for better access to EU funds. The project seeks to commit €20 million and trigger €90 million in citizen investments for sustainable energy projects. Funded by the EU's LIFE Programme, it promotes environmental, economic, and social benefits over financial profits.³⁸

MESTRI-CE Project - The MESTRI-CE project aims to finance climate-neutral buildings in Central Europe through a new investment model. It will develop data tools and green standards and establish five counseling centers. Running from April 2023 to March 2026, it involves Croatia, Poland, Italy, Austria, and Germany. ZEZ contributes by developing financing models, creating communication content, managing the Croatian counseling center, and collaborating on project activities. Funded by Interreg Central Europe, partners include regional energy agencies and financial advisory firms.³⁹

SustainCamp - SustainCamp promotes sustainability in island campsites, focusing on solar energy, waste, and wastewater management, biomass, and composting. Building on a successful 2015 project co-funded by the Environmental Protection and Energy Efficiency Fund, it developed technical documentation for ten camps, educated owners and campers, and connected camps with experts for safe project implementation. The project ran from 2014 to 2015.⁴⁰

CONGREGATE project - The project promotes building renovation and renewable energy cooperatives in Southern and Eastern Europe through targeted communication and awareness campaigns. Running from November 2020 to March 2023, it focuses on Bulgaria, Croatia, the Czech Republic, Greece, and Romania. It aims to enhance national building renovation strategies and establish public-private energy cooperatives. The project organizes events, conducts case studies, and supports feasibility studies to boost civic engagement and investment in sustainable energy solutions. Funded with €878,855, it involves multiple national and regional partners.⁴¹

SCCALE 20-30-50 project - The SCCALE 20-30-50 project aims to empower EU citizens to produce electricity by 2050 through innovative and sustainable energy efficiency models. It involves pilot projects and the development of the SCCALE Toolkit, supporting the creation and growth of energy communities. Key activities include developing guides, monitoring tools, financing models, and supporting policy development. The project, funded by Horizon 2020, aims to establish 26 energy communities during the project and support 130 more within five years. It started on June 1, 2021, and will last 42 months. Partners include REScoop.eu, Ecopower, Enercoop, EnergieSamen, and others.⁴²

CEES project - The CEES (Community Energy for Energy Solidarity) project addresses energy poverty in the EU by supporting over 17,000 energy-poor consumers and investing nearly €2 million in sustainable energy solutions. Funded by Horizon 2020, it aims to reduce emissions by over 7.5 GWh/year through energy solidarity mechanisms. Key activities include surveying current support methods, piloting promising approaches, and developing an Energy Solidarity Toolkit. The project involves seven partners and is led by the University of Birmingham, focusing on incorporating energy justice in all EU energy initiatives.⁴³

NUDGE project - The NUDGE project aims to enhance energy efficiency through behavioural science, encouraging consumers to adopt habits that reduce energy consumption. It utilizes digital tools like smart meters to help consumers monitor and manage their energy use

effectively. Running from September 2020 for three years, the project involves ten partners from seven European countries, testing behavioural interventions at five demo sites. Funded by the EU's Horizon 2020 program, it seeks to support public policies and promote sustainable energy behaviours.⁴⁴

ReRURAL project - The project aims to tackle energy poverty in rural areas of South-East Europe through energy efficiency and renewable energy solutions. Running from November 2023 to January 2026, it targets Bosnia and Herzegovina, Croatia, Kosovo, and Slovenia. The project promotes Energy Communities (ECs) and organizes local meetings, workshops, and summer schools to build awareness and capacity. It supports establishing one EC in each country and develops a pre-feasibility tool for planning energy efficiency measures. Funded with €499,757.50, the project is led by the SDEWES Centre and involves several regional partners.⁴⁵

Solar Adria project - The Solar Adria project promoted solar energy in Croatia, Montenegro, and Slovenia through participatory planning and capacity building. Running from October 2020 to September 2022 with €348,563 funding, it targeted local governments, the private sector, consumers, and NGOs. The project developed tools and guidelines to support solar energy projects, analyzed solar potential in Koper and Starigrad, and created an online platform for calculating solar production potential and facilitating stakeholder collaboration. It was implemented by the Energy Institute Hrvoje Požar (EIHP) with several partners.⁴⁶

mPOWER project - The project, funded by Horizon 2020, aims to foster fair, clean, and democratic energy transitions at the municipal level across Europe. Running from May 2018 for four years, it involves seven partner organizations. The project facilitates knowledge-sharing and collaboration among municipalities, developing best practice guides and policy recommendations to support local energy initiatives. It emphasizes democratizing governance, citizen participation, and public authority leadership in achieving post-carbon energy transitions. Key outputs include webinars, manuals, and policy briefings to aid municipal energy planning.⁴⁷

Relevant actors and stakeholders

NGOs

Zelena Energetska Zadruga , or Green Energy Cooperative (ZEZ)

- Its mission is to help citizens develop, invest in, and use renewable energy sources. ZEZ promotes social entrepreneurship, environmental protection, and community development through innovative economic models tailored to local needs. The cooperative consists of 18 members and employees with extensive experience in energy projects in Croatia and beyond. ZEZ operates independently, encouraging citizen involvement in energy transition processes.
- Board member of EU, the European federation of energy cooperatives. Involved in several Horizon2020 projects.
- Co-founder and co-leader of Cooperative for Ethical Financing.⁴⁸

Institute for Political Ecology (IPE)

- The Institute for Political Ecology (IPE) is a research and educational organization in Zagreb focused on alternative development models and democratic transformations. It addresses ecological changes as social phenomena, conducting transdisciplinary research and educational programs. IPE collaborates with domestic and international partners, providing expert analysis and platforms for discussions on sustainability, justice, and democracy. It engages in projects related to ecological transitions, climate justice, and social inequalities, and offers resources for initiatives and movements across Croatia and Europe.
- Involved in mpower project⁴⁹, funded by H2020, focusing on municipal energy transitions
- Working on DBU short study on „SOLAR ARCHIPELAGOS MANIFESTO - IN ACTION!“

Zadruga za etično financiranje or Cooperative for Ethical Financing (ZEF)

- Founded in 2014, ZEF is Croatia's largest cooperative with over 1200 members. It promotes a democratic, transparent, and socially responsible economy.
- Key initiatives include Croatia's first ethical bank and green electricity supply. Members, who are co-owners, access an internal market, business consulting, and EU project support. Annual income exceeds €250 million.⁵⁰

eko Kvarner Ngo

- | | |
|----------------------------|--|
| Governmental bodies | <ul style="list-style-type: none"> - The Ministry of the Economy and Sustainable Development (MESD) - The Ministry of Environmental Protection and Energy - Croatian Energy Regulatory Agency (CERA/HERA) - The Ministry of Physical Planning, Construction and State Assets - The Ministry of the Sea, Transport and Infrastructure - The Hydrocarbon Agency - The Croatian Energy Market Operator (CEMO) - The transmission/distribution system operators (CTSO/HEP-DSO) |
|----------------------------|--|

- | | |
|--------------------------|--|
| Local governments | <p>Village of Križevci</p> <p>Energy cooperative KLIK (Križevci Climate Innovation Laboratory)^{51 52}</p> <hr/> <p>Island Krk</p> <ul style="list-style-type: none"> - Energy Manager Island Krk (presentation at SCORE final conference 2021 “Assessment of the IEMD / RED II Transposition in Croatia”)⁵³ |
|--------------------------|--|

- | | |
|-----------------------|---|
| Private actors | European Asbestos Risks Association ⁵⁴ |
|-----------------------|---|

- | | |
|---|---|
| International/ supra-national actors | <ul style="list-style-type: none"> - United Nations Development Program (UNDP) in Croatia - the European Climate Initiative (EUKI) - the European federation of citizen energy cooperatives (RESCoop) - European Union LIFE Programme - Friedrich Ebert Stiftung Zagreb - presentation at SCORE final conference 2021 “Assessment of the IEMD / RED II Transposition in Croatia”⁵⁵ |
|---|---|

Summarizing evaluation

Fields of Action

Measures to advance the energy transition and community energy in Romania

Strengthening regulatory framework and simplifying regulations:

- Simplify the current complex registration procedures for Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs) to facilitate easier establishment and operation.
- Remove excessive geographic restrictions and reduce bureaucratic barriers to promote more community energy projects.
- Introduce special incentives and support schemes for RECs and CECs, including financial tools, grants, and subsidies to make energy sharing more feasible.
- Create tax incentives and financial support for citizens and businesses investing in renewable energy projects.
- Provide clear guidelines and standardized terms for energy sharing within communities to promote transparency and ease of implementation.
- Ensure non-discriminatory access to the grid and fair pricing for shared energy among community members.

Enhance grid modernization and connectivity:

- Invest in the modernization and digitization of the electricity grid to integrate increasing amounts of renewable energy efficiently.
- Improve connectivity between northern and southern Croatia, as well as with other EU countries, to enhance energy distribution and stability.

Expand renewable energy capacity:

- Accelerate the development of solar, wind, and geothermal energy projects to increase the share of renewable energy in the national energy mix.
- Prioritize the construction of offshore RES projects, such as wind farms in the Adriatic Sea, to utilize Croatia's vast offshore wind capacity without compromising marine biodiversity and habitats via regular monitoring and proactive measures.
- Leverage agrisolar (agrivoltaic) potential by installing solar power plants on low-productivity agricultural land to achieve multi-use benefits in energy and agriculture.
- Explore the development of floating solar power plants in aquaculture facilities.
- Support the development of energy-autonomous islands via RES solutions.

Support community energy initiatives:

- Foster the establishment and growth of community energy projects, such as rooftop solar installations, through capacity-building programs and co-financing.
- Promote the involvement of local authorities, SMEs, and citizens in the planning and development of renewable energy projects.

Upgrade district heating systems:

- Improve district heating systems by replacing outdated fuel oil boilers with biomass boilers, heat pumps, and high-efficiency cogeneration units utilizing RES.
- Reduce heat losses and enhance energy efficiency in the heating sector.

Increase energy resilience:

- Enhance measures to protect energy infrastructure from cyberattacks and extreme weather events linked to climate change.
- Implement the timely and effective Climate Change Adaptation Strategy to increase the resilience of energy systems to climate impacts.

Promote energy efficiency:

- Encourage energy efficiency measures in residential, transport, and industrial sectors through awareness campaigns and financial incentives.
- Support the adoption of electric vehicles and the establishment of alternative fuel infrastructure.

Foster stakeholders' collaboration:

- Enhance cooperation between local governments, citizens, and private entities to drive the transition to renewable energy.
- Engage regional and international partners in knowledge sharing and joint projects to promote community energy initiatives.

Educational programs and empowerment:

- Conduct training sessions, workshops, and educational programs to raise awareness and build skills related to renewable energy and community energy projects.
- Create and replicate information hubs, like the Climate Energy Office in Križevci, to provide citizens with access to resources and support for energy projects.
- Make use of civil society and academia resources in evaluating challenges and solutions for Croatia's energy transition.

Monitoring and evaluation:

- Establish a robust monitoring and evaluation framework to track the progress of renewable energy projects and community energy initiatives.
- Regularly assess the effectiveness of regulatory frameworks and support schemes, making necessary adjustments to enhance their impact.

By addressing these actions, Croatia can advance its renewable energy goals, promote community energy projects, and enhance its energy independence and sustainability.

Authors of the country profile: Roland Lleshi, Saeed Najd Ataei Sarkarabad, Tamara Mitrofanenko, Prof. Dr. Gesa Geißler

¹ https://european-union.europa.eu/principles-countries-history/eu-countries/croatia_en

² <https://data.worldbank.org/indicator/SP.POP.TOTL?view=chart>

³ <https://data.worldbank.org/indicator/AG.LND.TOTL.K2?view=chart>

⁴ <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?view=chart>

⁵ <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?view=chart>

⁶ <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=HR>

⁷ https://ec.europa.eu/eurostat/databrowser/view/earn_nt_net/default/table?lang=en

⁸ https://ec.europa.eu/eurostat/databrowser/view/earn_ses_pub2s/default/table?lang=en

⁹ <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>

¹⁰ <https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS>

-
- 11 <https://bankwatch.org/beyond-fossil-fuels/the-energy-sector-in-croatia>
 - 12 <https://www.trade.gov/country-commercial-guides/croatia-energy>
 - 13 <https://www.iea.org/countries/croatia/energy-mix>
 - 14 <https://ember-climate.org/countries-and-regions/regions/europe/>
 - 15 <https://mingo.gov.hr/UserDocsImages/KLIMA/Climate%20change%20adaptation%20strategy.pdf>
 - 16 https://commission.europa.eu/document/download/c4a12c32-7c7c-475a-80b9-366a7309bdc8_en?file-name=CROATIA_%20DRAFT%20UPDATED%20NECP%202021%202030%20%282%29_0.pdf
 - 17 https://commission.europa.eu/document/download/c4a12c32-7c7c-475a-80b9-366a7309bdc8_en?file-name=CROATIA_%20DRAFT%20UPDATED%20NECP%202021%202030%20%282%29_0.pdf
 - 18 <https://www.ebrd.com/news/2023/croatian-offshore-renewables-potential-up-to-25gw-study-finds.html>
 - 19 <https://balkangreenenergynews.com/croatia-has-vast-agrisolar-potential-study/>
 - 20 https://commission.europa.eu/document/download/c4a12c32-7c7c-475a-80b9-366a7309bdc8_en?file-name=CROATIA_%20DRAFT%20UPDATED%20NECP%202021%202030%20%282%29_0.pdf
 - 21 <https://www.energetskiportal.com/green-transformation-of-the-republic-of-croatia/>
 - 22 https://commission.europa.eu/document/download/c4a12c32-7c7c-475a-80b9-366a7309bdc8_en?file-name=CROATIA_%20DRAFT%20UPDATED%20NECP%202021%202030%20%282%29_0.pdf
 - 23 https://commission.europa.eu/document/download/c4a12c32-7c7c-475a-80b9-366a7309bdc8_en?file-name=CROATIA_%20DRAFT%20UPDATED%20NECP%202021%202030%20%282%29_0.pdf
 - 24 http://www.wecf.org/wp-content/uploads/2018/06/EnergyCoops_LongOnline.pdf
 - 25 <https://digital-skills-jobs.europa.eu/en/actions/national-initiatives/national-strategies/croatia-national-development-strategy-2030>
 - 26 <https://mingo.gov.hr/UserDocsImages/KLIMA/Climate%20change%20adaptation%20strategy.pdf>
 - 27 https://energy-communities-repository.ec.europa.eu/document/download/789a8cf2-f831-4791-9a22-0e0e030e636e_en?filename=ECR_MSfiche_Croatia_final.pdf
 - 28 <https://www.rescoop.eu/policy/transposition-tracker/enabling-frameworks-support-schemes/croatia>
 - 29 <https://communitypowercoalition.eu/wp-content/uploads/2024/04/Driving-the-transition-NECP-Brief-2.pdf>
 - 30 <https://www.zez.coop/en/krizevci-solar-roofs/>
 - 31 <https://www.balcanicaucaso.org/eng/Areas/Croatia/KLIK-the-Croatian-energy-cooperative-230037>
 - 32 <https://balkangreenenergynews.com/energy-transition-in-croatia-five-examples-of-good-practice/>
 - 33 https://www.energy-community.org/dam/jcr:dc5d5066-909f-4174-8baa-ac0ce9bb4740/WSRES032016_ZEZ.%20Energy.pdf
 - 34 <https://balkangreenenergynews.com/energy-transition-in-croatia-five-examples-of-good-practice/>
 - 35 <https://www.linkedin.com/in/energetska-zadruga-otok-krk-69a2391b5/?originalSubdomain=hr>
 - 36 <https://www.zez.coop/en/life-loop-projekt-za-razvoj-energetskih-zajednica-kroz-partnerstva-gradana-i-gradova/>
 - 37 <https://www.compile-project.eu/>
 - 38 <https://www.zez.coop/en/pristup-kapitalu-za-gradansku-energiju-acce/>
 - 39 <https://www.zez.coop/en/smart-management-and-green-financing-for-sustainable-and-climate-neutral-buildings-in-central-europe-mestri-ce/>
 - 40 <https://www.zez.coop/en/sustaincamp/>
 - 41 <https://www.euki.de/en/euki-projects/congregate/>
 - 42 <https://www.zez.coop/en/sccale-sustainable-collective-action-of-citizens-for-local-europe-2/>
 - 43 <https://www.zez.coop/en/cees-community-energy-for-energy-solidarity/>
 - 44 <https://www.zez.coop/en/nudge/>
 - 45 <https://www.euki.de/en/euki-projects/rerural-renew-rural-areas/>
 - 46 <https://www.euki.de/en/euki-projects/solar-adria/>
 - 47 <https://municipalpower.org/>
 - 48 <https://www.zez.coop/en/about/>
 - 49 <https://ipe.hr/en/projects/mpower/>
 - 50 <https://zef.hr/en/o-nama/o-zef-u>
 - 51 <https://www.krizevci.info/2020/03/06/kliknite-s-nama-u-krizevcima-osnovana-prva-energetska-zadruga-gradana/>
 - 52 <https://www.facebook.com/KLIK-Kri%C5%BEeva%C4%8Dki-Laboratorij-Inovacija-za-Klimu-109312797507913>
 - 53 https://www.score-h2020.eu/fileadmin/score/Extended_Draft_Agenda_-_Final_Conference_18_XI_2021.pdf
 - 54 <https://www.euki.de/en/euki-projects/krk-carbon-neutral-island/>
 - 55 https://www.score-h2020.eu/fileadmin/score/Extended_Draft_Agenda_-_Final_Conference_18_XI_2021.pdf