CROATIA

Country at a glance

- Population: 4.40 million (2010) [1]
- Total area: 56,594 sq. km [2]
- Carbon emissions per capita: 4.32 metric tons (2010) [3]
- Energy consumption per capita: 22.5 MWh (2010) [4]
- Percentage of global carbon emissions: 0.06% (2010) [3]

A wind-park in the region of Senj, Croatia. *Permission Under CC BY-SA 3.0 en.wikipedia.org/wiki/File:Vjetropark_kod_Senja2.JPG*

Wind Park off Adriatic Coast of Croatia

Wind power in Croatia is on the rise. Ever since the first wind-park installed in 2004, Croatia experienced a dramatic shift towards renewable energy. At present, Croatia's 200 wind-parks produce around 210 MW/year with total production capacity set to reach 1 GW by 2015.

Table 1 Breakdown of energy use, electricity and heat generation, 2010

	Primary energy sourced within country		Energy imports minus exports	Primary energy used within the country[a]			Electricity Generation[b]		Heat Generation[c]	
unit	ktoe	%	ktoe	ktoe	GWh	%	GWh	%	GWh	%
Coal, including brown coal & peat	0	0	700	683	7,940	8	2,385	17	0	0
Oil fuels	765	18	3,039	3,702	43,053	43	560	4	749	22
Natural gas	2,214	52	475	2,632	30,606	31	2,553	18	2,707	78
Nuclear	0	0	0	0	0	0	0	0	0	0
Hydroelectric	716	17	0	716	8,330	8	8,329	59	0	0
Biofuels and waste	500	12	-103	398	4,623	5	33	0	18	1
Solar photovoltaics	0	0	0	0	0	0	0	0	0	0
Solar thermal	5	0	0	5	61	0	0	0	0	0
Tide, wave and ocean	0	0	0	0	0	0	0	0	0	0
Wind	12	0	0	12	139	0	139	1	0	0
Geothermal	7	0	0	7	79	0	0	0	0	0
Electricity (imported)	0	0	410	410	4,766	5	0	0	0	0
Sub total Renewables	1,240	29	-103	1,138	13,232	13	8,501	61	18	1
Totals	**4,219**	**100**	**4,521**	**8,564**	**99,596**	**100**	**13,999**	**100**	**3,473**	**100**

Source: Based on World Energy Statistics and Balances Database 2012, "World Energy Balances." © OECD/IEA, 2012.

Notes:

Standard conversion used is 1 ktoe = 11.63 GWh

(a) Sum of energy sourced within country, energy imports minus exports, international marine and aviation bunkers and stock change flows.

(b) Includes all electricity generation, including any exported.

(c) Does not include electrical heating. Includes waste heat recovery from electicity generation plants.

Table 2 Breakdown of transport fuel use, 2010

(in ktoe)	Total transport mix	%	Domestic aviation	Road	%	Rail	Pipeline transport	Domestic navigation	Non-specified (transport)
Oil products	1,972	99	52	1,853	100	28	0	38	0
Natural gas	2	0	0	2	0	0	0	0	0
Biofuels and waste	3	0	0	3	0	0	0	0	0
Electricity	23	1	0	0	0	15	2	0	6
Sub total Renewables	3	0	0	3	0	0	0	0	0
Total	**2,000**	**100**	**52**	**1,858**	**100**	**43**	**2**	**38**	**6**

Source: Based on World Energy Statistics and Balances Database 2012, "World Energy Balances." © OECD/IEA, 2012.

Stand on climate change

The Republic of Croatia signed the Kyoto Protocol on 11 March 1999. Since Croatia joined the European Union (EU) in 2004, it acceded to the protocol on 30 May 2007. This was later enforced on 28 August 2007. Croatia is an Annex I member country under the Kyoto Protocol with an emissions reduction target of 5% for the commitment period of 2008-2012.

National climate change programmes

The Croatian Ministry of Environmental Protection, Physical Planning and Construction plays the central role in creating climate change policies and plans in accordance with the strategic priority objectives of environmental protection and enforcement regulations. The key document defining the position, goals and methods for fulfilling the commitments under the Convention and the Kyoto Protocol is the National Strategy and Action Plan for the Implementation of UNFCCC and the Kyoto Protocol [5]. Furthermore, in May 2008, the Croatian government adopted the Air Quality Protection and Improvement Plan for the Republic of Croatia 2008-2011 (Official Gazette 61/2008). The National Strategy and Action Plan for the Implementation of UNFCCC and the Kyoto Protocol is an integral part of this plan.

The Environmental Protection Act (OG 110/07) is the basic law regulating general issues of environmental protection in the Republic of Croatia, which includes objectives, principles and implementation methods, as well as the liability for environmental pollution. This law provides for the preparation of environmental protection documents and subordinate legislation for each individual area of influence. The Environmental Protection Strategy is the key document establishing and targeting objectives of environmental protection management in accordance with the development policy in the long run. The National Environmental Protection Strategy and the National Environmental Action Plan (OG 46/02) are documents intended to enable an integrated, effective and efficient implementation of environmental protection in the Republic of Croatia. The Strategy highlights two processes of vital impact on environmental protection in Croatia: the adaptation to the sustainable development concept and the EU accession process [6].

Croatia adopted several climate change policies due to its accession to the EU in July 2013 as the 28th member state of the EU. The new policies are primarily focused on the usage of technologies such as nuclear power but also include the promotion of renewable energy and increases in energy efficiency. Some of the notable legislation related to climate change area are:

- The Air Protection Act (OG 178/04, 60/08)
- Regulation on the monitoring of greenhouse gas emissions in the Republic of Croatia (OG 01/07)
- Regulation on unit charges, corrective coefficients and detailed criteria and benchmarks for determination of the charge for carbon dioxide emissions into the environment (OG 73/07, 48/09)
- Ordinance on the method and deadlines for calculation and payment of the charge on carbon dioxide emissions into the environment (OG 77/07)
- Ordinance on the availability of data on fuel economy and CO2 emissions of new passenger cars (OG 120/07) 70
- Air Quality Protection and Improvement Plan in the Republic of Croatia for 2008-2011 (OG 61/08)
- Regulation on greenhouse gas emission quotas and the method of emission allowance trading (OG 142/08)
- Regulation on implementation of the Kyoto Protocol flexible mechanisms (OG 142/08)
- Plan on allocation of greenhouse gas emission quotas in the Republic of Croatia (National Allocation Plan) (OG 76/09)

With regard to energy policies, the latest Energy Development Strategy of Croatia was adopted in 2009. The strategy looks ahead until 2020 and states Croatia's aim to continuously align its legislative and regulatory framework with the *acquis communautaire* in order to achieve the EU 2020 goals [7].

The strategy outlines the following primary objectives:

- An increased security of supply of energy services
- The security of competitiveness of the economy and the availability and affordability of energy services, and
- The promotion of environmental sustainability and the combating of climate change

Apart from the above legislation, the Government of Croatia has also undertaken several sectoral policy measures. They are:

Energy Sector

The Energy sector accounts for around 50% of total GHG emissions in Croatia. The activities intensified during the recent years, and a number of bylaws aimed at increasing energy efficiency and the use of renewable energy sources and efficient cogenerations have been passed. These should indirectly result in mitigation of the environmental impact of Energy sector. The Energy Strategy is a baseline document which defines energy policy and sets the following targets and measures for the reduction of GHG emissions [8]:

- Energy efficiency in energy production and consumption - 10% reduction of direct energy consumption by 2020 as compared to average consumption in the 2001–2005 period
- Increase in the share of renewable energy sources in gross direct energy consumption to 20% by 2020. Sectoral targets are:
  - 35% RES in electricity production, including large hydroelectric power plants (9.2% of total RES share)
  - 10% in transport (2.2% of total RES share)
  - 20% for heating and cooling systems (8.6% of total RES share)
- Inclusion in EU emission trading system and the application of other flexible mechanisms under the Kyoto Protocol
- Preparation for the application of CO_2 capture and separation technology in new coal-firing thermal power plants and storage in geologic formations
- Research and application of CO_2 injection technology for enhanced oil recovery (EOR)
- Decisions on the use of nuclear energy
- Promotion of research and transfer of new technologies for energy production, energy conservation, renewable energy sources, use of hydrogen, transportation efficiency, intelligent network systems, CO_2 storage, etc.

Transport Sector

- Expanding rail transport - Installation of truck terminals for heavy vehicles, extension of train platforms and increase capacity of trains by seven
- Introduction of biofuels - decision on percentage share of biofuels in total fuel energy consumption of 10% by 2020
- Promoting the use of low CO_2 vehicles - promotion of import of new hybrid cards with low emissions, fuel efficiency and CO_2 labelling schemes as incentives - promoting the use of gas in vehicles
- Consumption of LPG and CNG in vehicles to significantly reduce CO_2 emissions

Industrial Processes Sector

- N_2O emission reductions in nitric acid production – use of measures such as Non-selective Catalytic Reduction (NSCR) for N_2O reduction
- Reduction of clinker factor in cement and increase of recycled glass (cullet) – such measures to be conditioned by market requests and new standards of products. Production of recycled cullets particularly have potential for raw-material and energy savings along with cost-effectiveness for manufacturers
- Reduction of volatile organic compounds emission in solvent sector – implementation of solvent management plan, measures for modification of the application techniques and bio-filtration are methods to be used to reduce VOC's

Waste Management Sector

- Avoiding and reducing municipal waste generation – increase in public awareness campaigns to reduce overall municipal waste through recycling programmes

- Enhancement of separate collected and recycled municipal waste – establish recycling programmes in different parts of cities and encourage separate collection methods of waste
- Increasing of population involved in municipal waste collection system – involvement of community-based recycling and educational campaigns to encourage people towards cleaner and safer waste collection
- Landfill gas flaring or utilization of landfill gas for electricity generation – use of excess landfill gas as a means to produce electricity for national grid consumption
- Production of refuse derived fuel from cement industry – use of by-products from the cement industry to produce energy through incineration
- Thermal treatment of municipal waste – incineration of non-organic waste to reduce overall waste quantity and reduce burden of landfilling

Agriculture Sector

- Action plan for the agriculture sector from the aspect of climate change adjustment and greenhouse gas emissions reductions
- Rational usage of mineral fertilizers based on soil analyses and nutrient balance while implementing good agricultural practices
- Efficient management of organic manure – pollution control mechanisms to be adopted in agriculture to better manage organic wastes from animals

Forestry Sector

- Improving private forest management methods and practices – legislation to be amended in order to promote private forested areas
- Planting new forest on forest land without tree cover – afforestation methods
- Managing certain parts of previous agricultural areas that went through natural succession and became degraded forest vegetation – encourage afforestation in less suitable lands with tolerant species of trees
- Improving carbon sequestration in forest soils – increase capacity of carbon stocks
- Improving cropland management – ensuring pest management and other methods to safeguard crops

Ministries involved in climate change/energy policy making:

Ministries involved	Web links
Ministry of Agriculture	**www.mps.hr/**
Ministry of Construction and Spatial Planning	**www.mzopu.hr/**
Ministry of Environment and Nature Protection	**www.mzoip.hr/**
Ministry of Foreign and European Affairs	**www.mvep.hr/**
Ministry of Transport, Maritime and Infrastructure	**www.mppi.hr/**
Ministry of Science, Technology and Sports	**public.mzos.hr/Default.aspx**

Education institutes involved in climate change/energy policy making:

Education Institutes involved	Web links
Ruder Boskovic Institute – Division of Marine and Environmental Research	**www.irb.hr/eng**
Hrvoje Pozar Energy Institute	**www.eihp.hr/**
State Institute for Nature Protection	**www.dzzp.hr/**
Croatian Geological Survey	**www.hgi-cgs.hr/**

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[4] World Energy Statistics and Balances database 2012, "World Energy Balances." © OECD/IEA, 2012.

[5] National Strategy and Action Plan for Implementation – Government of Croatia. Available at: http://www.global-issues-rtd.info/programmes/122.html

[6] Fifth National Communication to the UNFCCC. Government of Croatia. Environmental Policies and Sectoral Measures.
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http://ec.europa.eu/clima/policies/g-gas/progress/docs/hr_2013_en.pdf

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