IEA Bioenergy

Croatia – 2018 update

Bioenergy policies and status of implementation

Country Reports

IEA Bioenergy: 09 2018

This report was prepared from the 2018 OECD/IEA World Energy Balances, combined with data and information provided by the IEA Bioenergy Executive Committee and Task members. Reference is also made to Eurostat. All individual country reports were reviewed by the national delegates to the IEA Bioenergy Executive Committee, who have approved the content. General background on the approach and definitions can be found in the central introductory report[1] for all country reports.

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NATIONAL POLICY FRAMEWORK IN CROATIA

Croatia`s target to increase the share of renewable energy to 20% in the annual gross energy consumption of the country by 2020 is defined in the National Energy Strategy 2009 – 2020 and implemented according to the National Renewable Energy Action Plan's (NREAP) dynamics.

The Croatian National Energy Strategy 2009-2020 has three basic objectives: 1) to increase the security of energy supply, 2) to develop a competitive energy system and 3) to ensure development of the sustainable energy sector. These objectives are particularly important due to Croatia's heavy dependence on energy imports which results in the country's vulnerability to energy price volatilities.

Croatia joined the EU in 2013 and follows the renewable energy targets of the EU. According to the NREAP (2013), the targeted shares of the three sectors heating/ cooling, electricity and transport are shown in the table below.

Table 1: *Croatia´s 2020 renewable energy targets.*

Sector	Share in gross final consumption per sector
Overall target	20.1%
Heating and cooling	19.6%
Electricity	39%
Transport	10%

Source: National Renewable Energy Action Plan of Austria (2013)[2]

[1] Available at https://www.ieabioenergy.com/iea-publications/country-reports/2018-country-reports/

[2] https://ec.europa.eu/energy/en/topics/renewable-energy/national-action-plans

To achieve the RES target (particularly for renewable electricity), quotas are set for each renewable energy source.

Table 2: *Quota left for renewable electricity production in Croatia*

	Eligible producers, operating plants	Project holders; pending plants	Quota left by 2020	Equivalent of installed power (MW_e)
Wind	70%	28%	2%	744
Small hydro	13%	6%	81%	35
Solid biomass	36%	60%	5%	120
Biogas	61%	26%	13%	70
Geothermal	0%	33%	67%	30

In Croatia, renewable electricity projects contracted by the end of 2015 are supported through a feed-in tariff (Art. 28 Energy Act). Every producer, who holds the status of "qualified producer" ("povlašteni proizvođač", Art. 9 Qualified Producer Rulebook) and has signed a formal agreement with the Croatian Energy Market Operator HROTE (as defined in Art. 53 Electricity Market Act) by the end of 2015, has the right to receive an incentive depending on the type of RES technology and power output of his RES-E plant or PV installation, as defined in the Tariff System (Art. 4 Tariff System for RES-E). From 2016, the supporting scheme changed from feed-in system to market premium system with the Act on Renewable Energy Sources and High-Efficiency Cogeneration enforcement. RES-E is promoted through a premium tariff and a guaranteed feed-in tariff (for installations of <30 kW) allocated through tenders. So far no tenders have been organised due to the delays in adopting the necessary secondary legislation.

Renewable energy loans are issued by the Croatian Bank for Reconstruction and Development (HBOR). In accordance with the provisions of the Environmental Protection Act (Art. 1, 18 and 34 Environmental Protection Act), the State is bound to support and finance projects aiming at environmental protection. The HBOR is obliged to support projects aiming at environmental protection (Art. 10 par. 2 no. 5 HBOR Act). On this basis, the HBOR has launched the Loan Programme for Environmental Protection, Energy Efficiency and Renewable Energy, which supports investments in primary sources, such as initial funding, land, buildings, equipment and devices (Point 1 HBOR Programme for Environmental Protection).

In Croatia, there are currently no direct support schemes for RES heating and cooling. However, the Energy Strategy adopted in 2009 obliges the Croatian State to encourage the future use of RES and to achieve a higher percentage of primary use of RES in the heating sector (Cooling is not mentioned.) Indirectly, RES heating and cooling is promoted through various energy efficiency programmes (Environmental Protection and Energy Efficiency Fund, HBOR, commercial banks…) where a building could, by changing the fuel for heating and cooling, advance to energy performance certificate from D to B or A.

The Biofuel Act states that the Croatian State needs to adopt an Energy Action Plan and file in annual reports on placing biofuels on the market (Art. 7 and 8 Biofuel Act). The last Energy Action Plan was adopted in the year 2010 and sets the goal of a biofuel market share of 10% in the transport sector by 2020.

These objectives are obliging the actors on the market to follow the goals set in the action plans and to prepare their own plans and programmes of placing biofuels on the market (Art. 14 and 15 Biofuel Act). The Act also foresees that the Ministry of Economy issues Quota Obligation Rules and an Environmental Penalty Decree issued by the Government in case the obligations are not met (Art. 14a and 29 Biofuel Act).

In Croatia, there is a special subsidy for the promotion of biofuels (Art. 18 Biofuel Act). This subsidy is paid by the Croatian Energy Market Operator (HROTE) to the eligible producers (Art. 19 Biofuel Act). This measure was abruptly abandoned in 2012. Biofuels market has been reduced to biodiesel from waste cooking oil since abandonment of subsidies.

The Biofuel Act also sets the procedure of obtaining the subsidy as well as the minimum and maximum production that is promoted. The amount of the subsidy is set by the Government annually for the upcoming year by the end of November in the Subsidy Decision (Art. 19, 21 and 22 Biofuel Act, Art. 1, 2, 7 and 8 Biofuel Promotion Decree and Art. 1 Subsidy Decision 2014).

The Excise Duty Act sets the excise duty on biofuels to 0 in order to increase their distribution.

Source: http://www.res-legal.eu/search-by-country/croatia, http://www.eihp.hr/wp-content/uploads/2018/03/EUH2016.pdf

A detailed description of all fiscal and non-fiscal supports for bioenergy development is available at: http://www.iea.org/policiesandmeasures/renewableenergy/?country=Croatia

TOTAL PRIMARY ENERGY SUPPLY (TPES) AND THE CONTRIBUTION OF BIOENERGY

The total primary energy supply of Croatia in 2016 amounted to 355 petajoule (PJ) and is dominated by fossil fuels (70%). Oil products account for one third (132 PJ), natural gas for around a quarter (91 PJ) and coal products another 8% (27 PJ). Renewable energy sources have a share of 24.6% or 84 PJ – 15.3% bioenergy and 8.3% other renewable energy sources. 20 PJ of electricity is imported, which represents 5.6% of Croatian TPES.

Compared to 5 years earlier (2011) the share of natural gas decreased from 28.0 to 25.6% and oil products from 38.9% to 37.3%. The share of coal remained stable. There was a substantial increase of renewable energy from 18.6% to 23.4%, with high volatility in hydropower. Imported electricity from neighbour countries is consistently high, representing between 4 and 7% of TPES (20 to 40% of electricity consumption is imported, depending on domestic hydropower production).

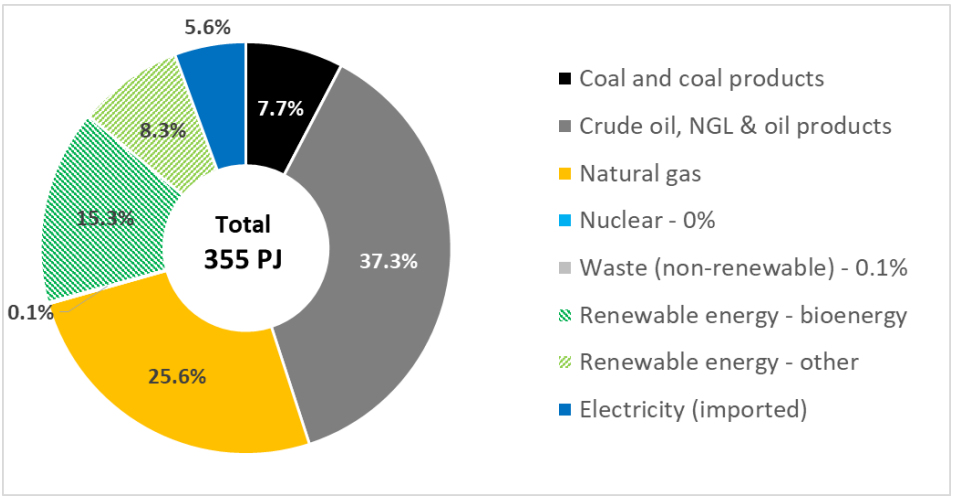

Figure 1: Total primary energy supply in Croatia in 2016 (Source: World Energy Balances © OECD/IEA 2018)

The total primary energy supply of renewable energy sources is mostly covered by energy from biomass, with 65% (54 PJ). Hydropower amounts for 25% (25 PJ); wind energy for another 4.4% (3.7 PJ) and solar energy less than 1% (0.7 PJ). Mind that energy from hydropower fluctuated between 17 and 32 PJ in the past 5 years, which is related to hydrological circumstances.

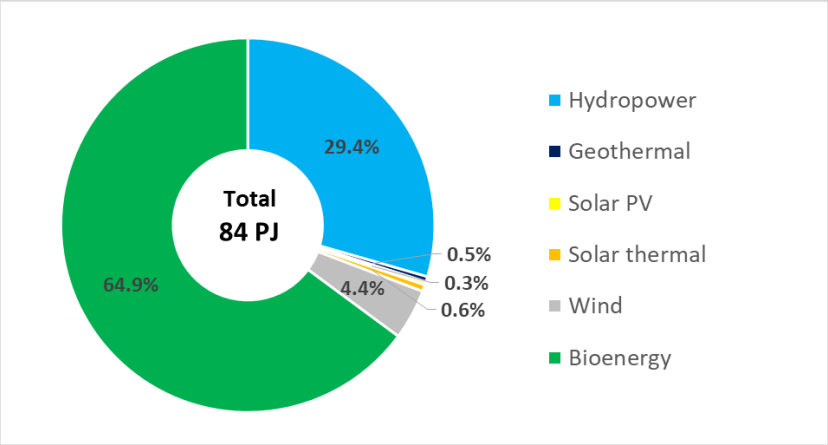

Figure 2: Total primary energy supply of Renewable Energy Sources in Croatia in 2016 (Source: World Energy Balances © OECD/IEA 2018)

More than 96% of the bioenergy consumed in Croatia comes from solid biofuels (52 PJ), of which most (47 PJ) in the residential sector. The role of biogas (2 PJ) is much smaller. Biodiesel, biogasoline and energy from municipal waste (MSW) were negligible in 2016 (biodiesel consumption was around 1.5 PJ a few years earlier).

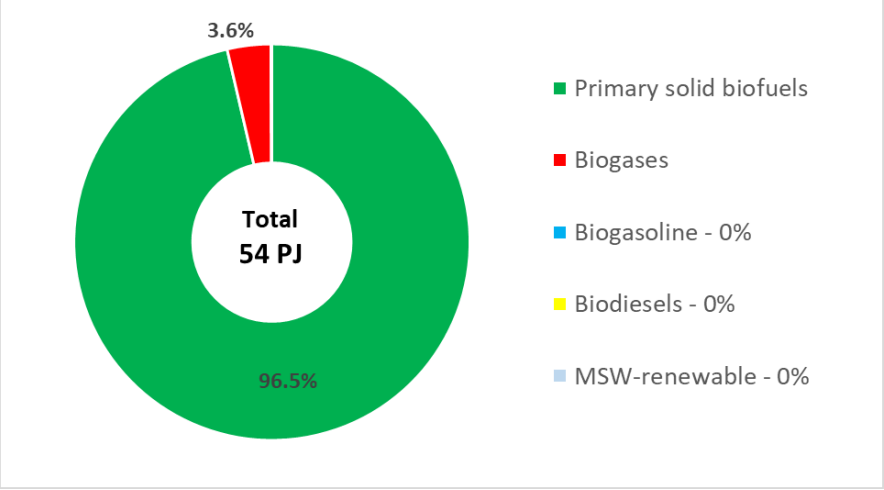

Figure 3: Total primary energy supply from bioenergy in Croatia in 2016 (Source: World Energy Balances © OECD/IEA 2018)

The share of bioenergy in Croatian TPES increased steadily from 9% in 1990 to 13% in 2005. After 2005, bioenergy supply is rather constant, at around 52 PJ. While bioenergy initially solely came from solid biomass, since 2009 biogas and liquid biofuels were also introduced, although with a limited role compared to solid biomass. While liquid biofuels have dropped to insignificant levels in 2016, biogas has a consistent growth.

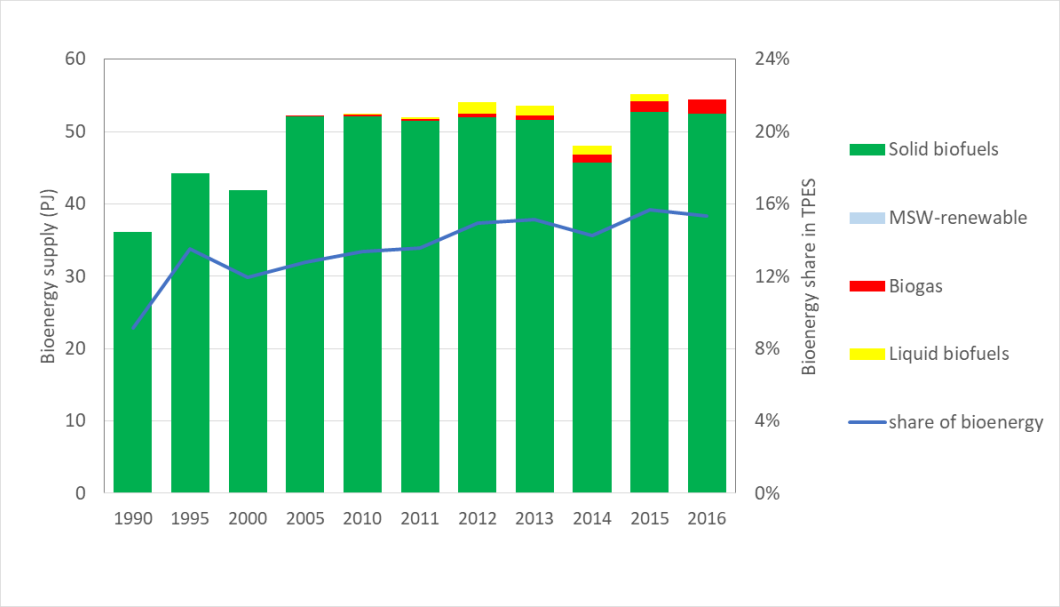

Figure 4: Development of total primary energy supply from bioenergy in Croatia 1990 – 2016 (Source: World Energy Balances © OECD/IEA 2018)

Table 2 expresses the 2016 TPES figures per capita, considering Croatia's population of 4.17 million people. Compared to the other 22 member countries of IEA Bioenergy (expressed per capita), Croatia ranks in the top 10 for solid biofuels, halfway for biogas, and at the low end for liquid biofuels and for renewable MSW.

***Table 2**: Total primary energy supply per capita in 2016*

	GJ/capita
Total energy	85.0
Bioenergy	13.0
Solid biofuels	12.6
Renewable MSW	0.0
Biogas	0.5
Liquid biofuels	0.0

Source: World Energy Balances © OECD/IEA 2018

Role of bioenergy in different sectors

Croatia has a high share of renewable electricity (two thirds of overall electricity production), which is mostly hydropower and a small role of bioenergy.

The share of biofuels for transport went down from almost 2% in 2012 to insignificant amounts in 2016.

Overall, the direct share of biomass for heating in the different sectors is around 36%. In the residential sector biomass represents about 60% of fuel/heat consumption. Heat output generated and sold by CHP plants and heat plants represents around 7% of fuel/heat provided, of which on average 10% is

produced from biomass.

Table 3: Role of bioenergy and renewable energy in electricity production, transport energy consumption and fuel/heat consumption in 2016

Sector	Share of bioenergy	Share of renewable energy	Overall production/ consumption
Electricity production	3.4%	66% (Hydro: 45%)	12.6 TWh (45 PJ)
Transport energy (final consumption)	0.0%	0.7%	85 PJ
Overall fuel and heat consumption[3]	Direct biomass: 36.4% Biobased heat: 0.7%	37.8%	132 PJ

Source: World Energy Balances © OECD/IEA 2018

According to Eurostat[4], the following renewable energy shares in gross final energy consumption were reached in Croatia in 2016:

- Overall share: 28.3%
- In heating and cooling[5]: 37.6%
- In electricity: 46.7%
- In transport: 1.3% (3.6% in 2015)

Mind that some of these figures can differ from the IEA derived data because of different accounting rules, particularly for renewable energy in transport.

Although it appears that Croatia has largely reached its overall renewable energy target for 2020, also for electricity as well as heating and cooling (see Table 1), a revision of the NREAP targets has to be made. Namely, the 20% target share of renewable energy in gross final energy consumption has been based on a 12.6% share in 2005. Following a correction in national energy balances due to the recorded biomass consumption in households, a correction of historical data trends is needed. With this correction, the share of renewable energy in 2005 gross final consumption was 23.8% and not 12.6%. Applying the same methodology, the corrected target for 2020 would be a 31.2% share of renewable energy in gross final consumption. National energy strategy is evolving in 2018 and this issue is expected to be tackled too.

[3] This includes final consumption of fuels and heat in industry, the residential sector, commercial and public services and agriculture/forestry. Transport fuels are excluded. Energy used for transformation and for own use of energy producing industries is also excluded.

[4] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_ind_335a&lang=en

[5] In 2016, the national energy balances have been corrected for biomass (wood fuel) supply for heating. The outcome of the nation-wide survey on fuel consumption in households applied on census 2011, revealed that 53.36% of total final energy consumption in Croatian households is related to solid biomass, dominantly 95% for space heating in 2012. Only 0.56% of biomass share is attributed to modern biomass fuels.

RESEARCH FOCUS RELATED TO BIOENERGY

Croatia is member of IEA Bioenergy Task 43 (Biomass Supply for Energy Markets) in the research period 2015-2018, with Energy Institute Hrvoje Požar and the Ministry of Agriculture as a contracting party. The main activities are related to Work Package 1: Landscape management and design for bioenergy and bio-economy.

There are several on-going research projects that are related to development of bioenergy markets, out of which one could highlight:

1. H2020 Biogas Action – Development of sustainable biogas markets (2016-2018)
2. H2020 up running: Take-off for sustainable supply of woody biomass from agrarian pruning and plantation removal (2017-2019)
3. H2020 biomaSudplus: Developing the sustainable market of residential Mediterranean solid biofuels (2016-2018)
4. H2020 BBI GRACE: GRowing Advanced industrial Crops on marginal lands for biorEfineries (2017-2022)
5. DSPF Farm Circle – Young Farmers Circles of Circular Economy (2018)
6. COST Action CA 17128: Establishment of a Pan-European Network on the Sustainable Valorisation of Lignin (2018-2022)
7. H2020: ROSEWOOD: Sustainable Wood for Europe (2018-2020)
8. Interreg Danube Transnational Programme FORESDA Forest-based cross-sectoral value chains fostering innovation and competitiveness in the Danube region (2017-2019)
9. Interreg Danube Transnational Programme DanuBioValNet Cross-clustering partnership for boosting eco-innovation by developing a joint bio-based value-added network for the Danube Region (2017-2019)

In 2017, Croatia joined the BIOEAST initiative: Central-Eastern-European Initiative on Knowledge-based Agriculture, Aquaculture, Forestry in bioeconomy.

RECENT MAJOR BIOENERGY DEVELOPMENTS

Since January 2016, Croatian support system for renewables changed from a feed-in-tariff system (FiT) to a market premium system through the Law on Renewable Energy Sources and High Efficient Cogeneration (Zakon o obnovljivim izvorima energije i visokoučinkovitoj kogeneraciji, OG 100/2015). The implementing regulations are pending.

The change of the supporting system has accelerated quota occupation with projects in development in late 2016. In the bioenergy sector, the solid biomass quota has been fully exploited (120 MWe) at a point but some of the contracted projects are failing in keeping up with the legal deadlines for project implementation. As a consequence, the contracted projects are losing the contracted quota share. In mid-2018, there were 5.6 MWe and ~9 MWe space available for solid biomass and biogas projects. All projects that have earned quota rights by 2016 are eligible for the FiT but those who have failed to fulfil the requirements for implementation are losing both eligibility for the FiT and quota share.

Source: HROTE www.hrote.hr Croatian Energy Market Operator

In early 2016, Eurostat has reported that "in Croatia, the share of energy from renewable sources in gross final consumption of energy in 2014 was 27.9%, as against 28.1% in 2013. In that way Croatia exceeded the 2020 target of 20% and reached the EU target for 2030, according to Eurostat's report." (https://about.hr/news/croatia/croatia-achieves-2020-target-share-renewables-energy-consumption-9766). This is due to the results from the door-to-door study from the National Bureau of Statistics on final energy consumption in households for 2012. The survey has revealed that fuel wood consumption was underestimated 3-4 fold in the previous methodology based on the heating energy supply. The change in methodology made a shift for the 2005 baseline necessary too. At this point it is unclear how the situation will develop.
http://www.dzs.hr/Hrv_Eng/Other/Podaci%20o%20energetskoj%20ucinkovitosti%20u%20kucanstvima%20i%20uslugama%20u%202012.pdf

In 2018, the Act on Woody Short Rotation Coppice has been adopted, allowing additional supply chain for the bioenergy sector.

LINKS TO SOURCES OF INFORMATION

Croatian Energy Market Operator: www.hrote.hr

https://about.hr/news/croatia/croatia-achieves-2020-target-share-renewables-energy-consumption-9766

http://www.dzs.hr/Hrv_Eng/Other/Podaci%20o%20energetskoj%20ucinkovitosti%20u%20kucanstvima%20i%20uslugama%20u%202012.pdf

Energy Institute Hrvoje Požar: http://www.eihp.hr/wp-content/uploads/2018/03/EUH2016.pdf