The Environment in Your Pocket I-2020

REPUBLIC of CROATIA
Ministry of Economy and
Sustainable Development

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Basic data on the Republic of Croatia

REPUBLIC of CROATIA
Ministry of Economy and Sustainable Development

Mainland surface area	56 594 km^2
Territorial sea and internal sea waters	31 479 km^2
Coastline length	6 278 km
No. of islands, rocks and reefs	1 185
Highest point	peak Dinara, 1 831 m
Counties	21
Cities and municipalities	556 (128 and 428)
Population, estimation mid 2018	4 087 843
Population density per km^2, 2018	72,2
Inhabited islands	47
Language	Croatian
Script	Latin
Political system	Parliamentary democracy
GDP per capita 2018	12 615 EUR

Introduction

Healthy and stable ecosystems are a precondition for preserving human health. The global pandemic situation caused by the outbreak of COVID-19 has additionally highlighted this issue. The reasons for the increased risk of zoonosis, among the other, are the loss and degradation of natural habitats (especially forest) and increased human contact with wild animals. From environmental perspective, preliminary data show that air, water and sea quality has improved during the pandemic situation. Therefore, at this moment, we have the opportunity to rethink about the human impact on the environment and nature, but also to take advantage on the conclusions as a kind of guide in finding the ways to reduce our ecological footprint. New European policies, such as the Green Deal[1], address climate crisis and biodiversity loss, and will certainly play a significant role in this societal transition. Based on the 25 selected indicators presented in this publication, it can be concluded that significant progress has been made in environmental protection, but still there are areas that require stronger action. For example, emissions of acidifying substances from anthropogenic sources into the air have been reduced (except for ammonia). Air pollution by PM_{10} (particulate matter) is still present in populated areas of continental parts of Croatia. According to the records of the Union Registry for Emissions Trading System- ETS, in the period from 2013 to 2018, total annual greenhouse gas emissions in Croatia were reduced by about 15%. Due to the increase of the installed capacity, the production of electricity from renewable sources (RES) continues to grow. Energy consumption has been decreased in recent years, which can be also attributed to the implementation of energy efficiency measures. From the industrial sector, emissions into the air have also been reduced, but there is still a room to encourage alternative technologies, such as biomass and biogas plants and the use of RES. The commitment to improve organic farming in Croatia is the one of desirable directions of development, since it is beneficial for climate change mitigation, conservation of biodiversity and natural resources is. Nevertheless, stronger application of development-oriented measures is expected in the field of organic agricultural production, as well as in the consumption of organic food, which in Croatia amounts to 23 EUR per capita (three times less than the value estimated for EU-28 average).

Croatia has achieved the main general objective of sustainable production and consumption, which is the absolute separation of economic growth from the environmental burden due to emissions of pollutants into the air. It is also encouraging that revenues and the number of employees in the sector for environmental goods and services have been growing in recent years.

Ministry of Economy and Sustainable Development

1 https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf

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Air

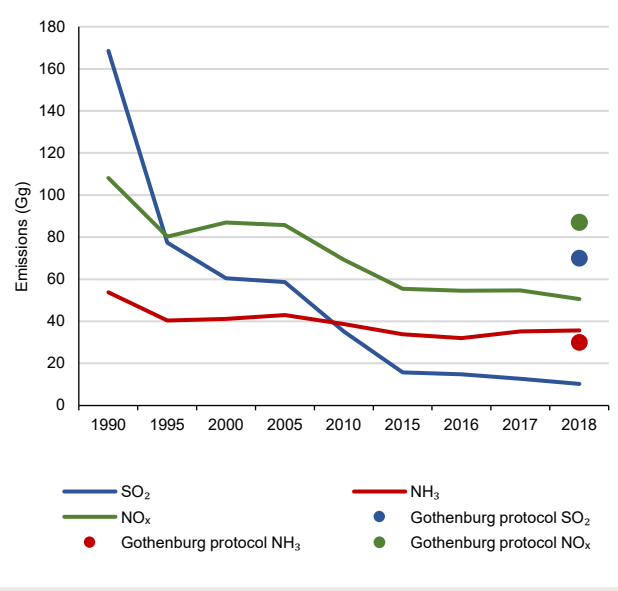
Trend in the emissions of acidifying substances

The primary pollutants that cause acidification and eutrophication are sulphur dioxide (SO_2), nitrogen oxides (NO_X) and ammonia (NH_3). These pollutants lower pH values of water and soil, causing acidification of aquatic ecosystems and forests. Since 1991, the Republic of Croatia has been a party to the Convention on Long-Range Transboundary Air Pollution (LRTAP) and its seven protocols aimed at limiting anthropogenic emissions, including SO_2, NO_X and NH_3.

Trend and current state

Emissions of major acidifying substances indicate a general downward trend. In 2018, Croatia met the targets for SO_2 and NO_X emissions under the Gothenburg Protocol setting national emission quotas. However, the target for NH_3 was not met, as emissions were above the 30 kt quota. This exceedance is due to a change in calculation of NH_3 emissions. In the period from 1990 to 2018, SO_2 emissions have been reduced continuously, by a total of 93,8%, due to the transition from high-sulphur to low-sulphur fuels. NO_X emissions also decreased compared to 1990 (by 53%). The dominant source of NO_X is fuel combustion in energy, especially in road transport, and emissions have been reduced due to the introduction of catalytic converters and stricter standards for emissions from road vehicles. In the same period, NH_3 emissions were reduced by 34%, and the main source was the agriculture sector with a share of 82%.

Trend in the emissions of acidifying substances SO_2, NO_X and NH_3 (Gg)



Source: MESD

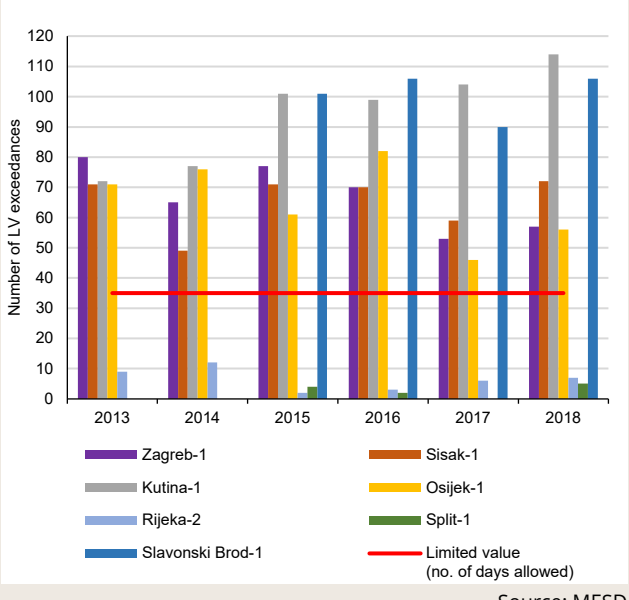
Number of limit values exceedances of the particulate matter PM_{10} in urban areas

Particulate matters (PM_{10}) are a mixture of organic and inorganic particles suspended in the air, in the form of fine dust less than 10 μm. They are formed mainly by fuel combustion in household furnaces, in road transport and industry. They are dangerous to human health because they penetrate and remain in respiratory tract and cause inflammatory changes, infections and an increase in the incidence of allergies. In the addition to the effect on human health and shortening life expectancy, poor air quality also causes economic losses through higher health care costs and lower labor productivity.

Trend and current state

With regard to the protection of human health, the Regulation on levels of pollutants in ambient air[2] prescribes a limit value (LV) for the concentration of PM_{10} in the air of 50 μg/m³, which must not be exceeded more than 35 days per year. The problem of air pollution with particulate matters is still pronounced in populated areas in the continental part of Croatia. In the period from 2013 to 2018 in the agglomerations of Zagreb and Osijek and in larger cities of the industrial zones: Sisak, Kutina and Slavonski Brod, the daily LV in all years was exceeded. At the measuring stations in the coastal area, Rijeka and Split limit value has not been exceeded.

Number of LV exceedances of PM_{10} in urban areas (GV 50 μg/m³, allowed 35 days per year)



Source: MESD

2 OG 117/2012, 84/2017

Climate change

Greenhouse gas emmisions by sectors

The largest contribution to the total greenhouse gas emissions in Croatia in 2018, out of a total of 23 793 kt greenhouse gases (CO_2-eq), was made by the Energy sector with 69.11%. It was followed by Agriculture (11.43%), Industrial processes and Product use (10.89%) and the Waste sector (8.57%). The only sector that contributes to the removals of greenhouse gases by sinks is LULUCF[3].

Trend and current state

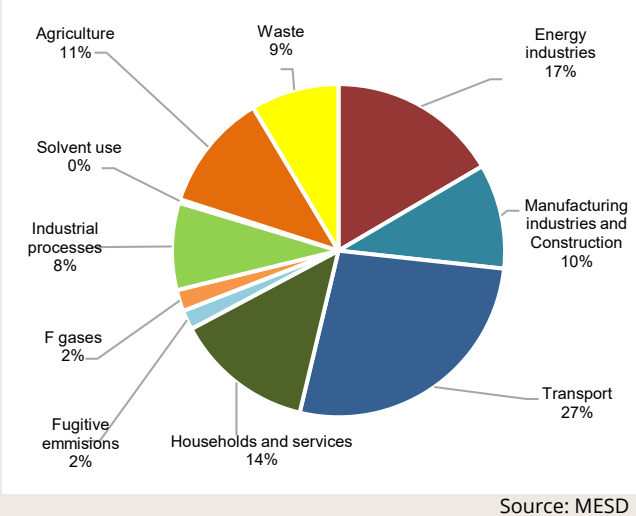
The Energy sector with sub-sectors Transport (with 27% of total emissions) and Energy industries[4] (17%) have largest share in total CO_2-eq emissions. Households and services (14%), Agriculture (11.4%) and Manufacturing industries and Construction (10%) are follow. Fugitive emissions, which occur due to leakage or evaporation of fossil fuels, participate with 1.9%.

Industrial processes participate with about 8% in total CO_2-eq emissions, and their source is a so-called process emissions from the manufacture of non-metallic mineral products (cement, lime and ceramic products), manufacture of chemicals, metals, glass, and due to non-energy use of fuels and the manufacture of electronic components. Emissions caused by the consumption of so-called F-gases used in refrigeration and air conditioning as substitutes for ozone-depleting substances are represented in total emissions with 2%, and Solvent use sector with only 0.3%.

3 Land Use, Land Use Change and Forestry (LULUCF) contributes to reducing greenhouse gas emissions by sinks.

4 Fuel combustion in thermal power plants, heating plants, refineries and emissions from petroleum and gas refining.

Share of greenhouse gas emmisions by sectors



Source: MESD

Climate change

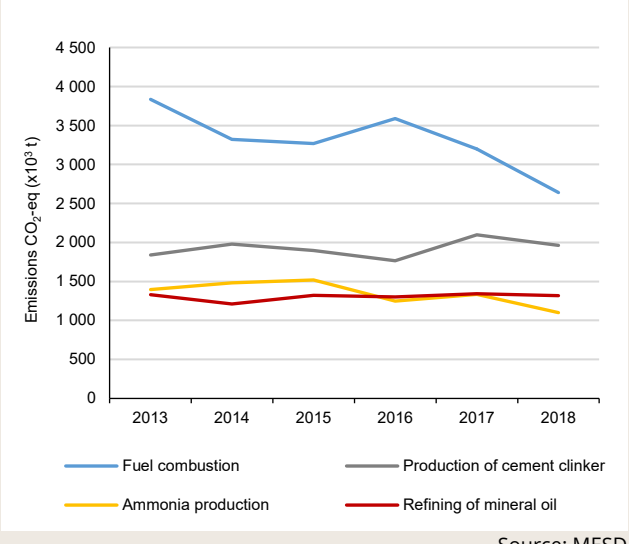
Emissions trading system in Croatia

Since 1st of January 2013, Croatia has been part of the European Emissions Trading System (EU ETS), which includes aircraft operators and stationary installations performing activities listed in Directive 2003/87/EZ of the European Parliament and of the Council.

Trend and current state

From 2013 to 2018, total annual greenhouse gas emissions in Croatia were reduced by 14.5%. The largest reductions in emissions were recorded in fuel combustion and ammonia production, which were the main contributors to reducing emissions. The production of cement clinker and refining of mineral oil, although together they accounted for 37% of total greenhouse gas emissions, showed a small increase that does not contribute significantly to the total emissions. In the observed period, the largest increases in emissions were recorded by aviation (by 40%), the manufacture of mineral wool insulation materials (by 31%) and manufacture of ceramic products (by 27%). These activities, together with the production of crude iron or steel, production of lime or calcination of dolomite or magnesite and with manufacture of glass accounted for only 7% of total emissions and had small impact on overall reduction of greenhouse gas emissions. The remaining 93% of total emissions were activities shown in the picture.

Greenhouse gas emissions by activities



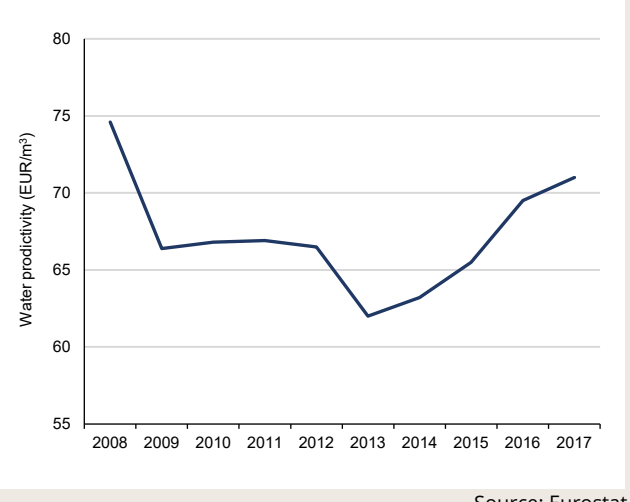
Source: MESD

The Europe 2020[5] strategy emphasizes the importance of urgent transition to the efficient use of natural resources, including water. As a measure of water efficiency, the indicator water productivity is used, which provides information on the economic profit generated by the amount of water abstracted.

Trend and current state

The economic structure of the country and the share of industries that are large consumers of water have a strong impact on water productivity. The lower water productivity may mean that water is used extensively in the economic and industrial structure of a country. On the other hand, economies characterized by slower economic growth and lower water consumption may have a relative high value of water productivity. In addition to the economic and industrial structure of a country, the change in water productivity is primarily influenced by real productivity improvements reflected in the use of new technologies and application of measures for saving and reuse of water (eg water recirculation in production processes). From 2008 to 2013, water productivity in Croatia was decreasing, after which it began to grow slightly, which was in line with the growth trend of industrial production and GDP. The highest water productivity in Europe records Luxemburg and Denmark, while Estonia and Bulgaria have the lowest. Based on data reported in the period from 2008 to 2017, Croatia is ranked on 14th place among EU-28 countries.

Water productivity



Source: Eurostat

5 https://strukturnifondovi.hr/wp-content/uploads/2017/03/Strategija-EUROPA-2020.-hr.pdf

Lead (Pb) is naturally found in the soil formed by the depletation of parent rock, in the usual mean concentration of 32 mg/kg (ranking from 10 to 67 mg/kg). Soil pollution by lead from an anthropogenic source occurs through dry and wet deposition from air and flood waters. The prescribed limit values for soil are 50-300 mg/kg dry matter[6]. It is a toxic metal that accumulates in bones, blood, liver and kidneys. It can cause damage to almost all organs, especially the central nervous system of humans and animals.

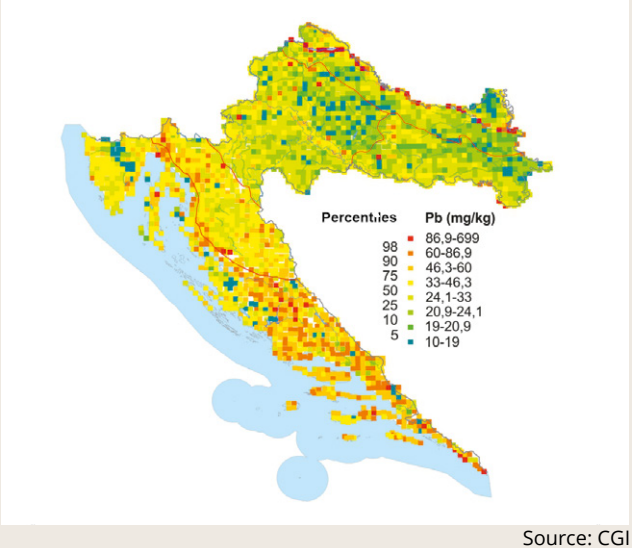
Trend and current state

In general, amnog anthropogenic sources of lead emissions the production processes where lead is the raw material and the use of lead-containing fuels could be stand out. The highest concentration of lead were measured in the valleys of river Drava and Mura, as a consequence of upstream mining and industrial activities, and in coastal and mountainous Croatia, which is associated with the composition of red soil and atmospheric pollution.

In Croatia, the main sources of lead emissions are transport, industry (with a predominance of glass and steel production), small combustion plants, and working machines. Lead emissions in 2018, compared to 1990, were reduced by 98.5%. The historical trend of lead emissions has recorded several large reductions - first in 1996, when the content of Pb in leaded gasoline was reduced, and in 2006, when its use was completely banned. Pb emissions from industry have been significantly reduced before, and the most significant reduction was due to the cessation of steel production in Siemens-Martin furnaces at the Sisak Ironworks in 1991.

6 Council Directive of 12. June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture (86/278/EEC)

Soil pollution by lead



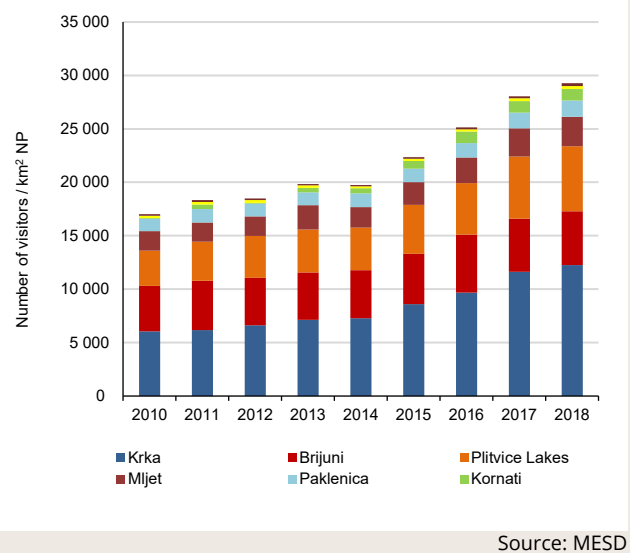
Source: CGI

The data show that in a short period of the tourist season, the number of visitors in protected areas – national parks (NP) is intensifying, which represents a potential pressure on biodiversity and the quality of environmental components. The share of the area of all NPs in total surface area of Croatia is 1.1%, i.e. 979.63 km2, of which 763.11 km^2 is on the land and 216.52 km^2 at the sea. Since visitors are not present on the entire surface area of NP, it is estimated that the bulk of the load could potentially occur on about 2% of the NP surface area.

Trend and current state

From 2010 to 2018, the total number of visitors in all NPs increased from 2 042 652 to 3 898 581 (by about 91%). The most visited are Plitvice Lakes NP with 1 796 670 visitors and Krka NP with 1 354 802 visitors. Consequently, the increase in the number of visitors per km^2, in the observed period, in the Plitvice Lakes NP was 84%, and in the Krka NP 103%. Almost half (46%) of the total number of visitors refers to the Plitvice Lakes NP. However, in relation to the surface area, the largest number of visitors was recorded in the Krka NP, where in 2018 12 246 visitors were recorded per km^2, followed by Plitvice Lakes with 6 063 and Brijuni with 5 052 visitors per km^2. Although these are the least visited NPs, the attendance of NP Northern Velebit and NP Risnjak is growing significantly. To determine the carrying capacity of each NP, one of the desirable measures for the preservation of these natural values is the adjustment of the protected area management, which should relieving the most visited NPs and encourage attendance in less visited NPs.

Number of visitors in national parks (by km^2 NP)



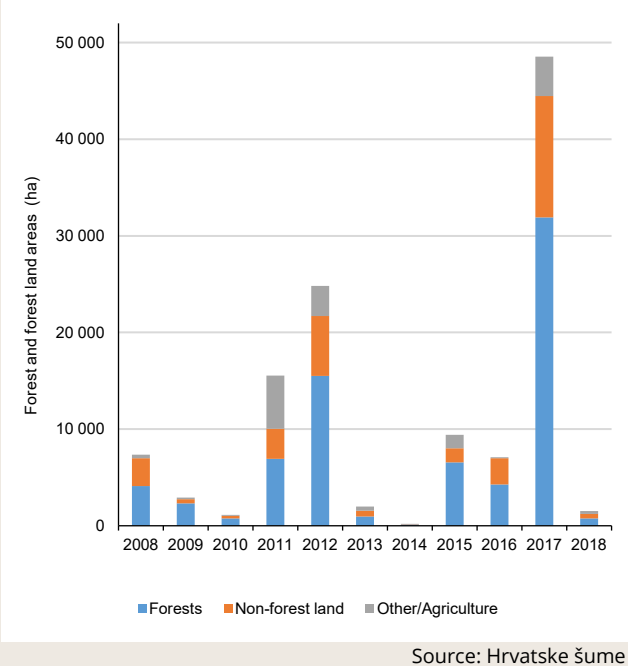
Source: MESD

In the Mediterranean area, forest fire can be considered as natural phenomenon. However, the consequences of climate change combined with human impact have caused a change in natural fire regime and occur more frequently, with greater intensity. It is estimated that over 95% of fires are caused by human activities, and on average, forests and forestland are the most affected (about 60%).

Trend and current state

According to the European Forest Fire Information System (EFFIS), over 2 500 fires were recorded in Croatia from 2008 to 2018. The Mediterranean part of the country, which includes the coast and islands, has a high risk of forest fires during the summer months and in dry periods. The consequences are evident in the value of the burned wood mass, but even more worrying is the lost value of the welfare functions of forests. This is manifested in soil damage, destruction of flora and fauna and reduced landscape and biological diversity, as well as consequences such as reduced air quality and oxygen concentration and in the end the impact on the climate of the burned area. If it is not properly intervened immediately after the fire, the soil becomes susceptible to erosion, which significantly complicates the forest recovery. The approach to the restoration of an individual burned area depends on the self-renewing vegetation and the amount of soil on the burned area.

Forestland areas burned in forest fire (ha)



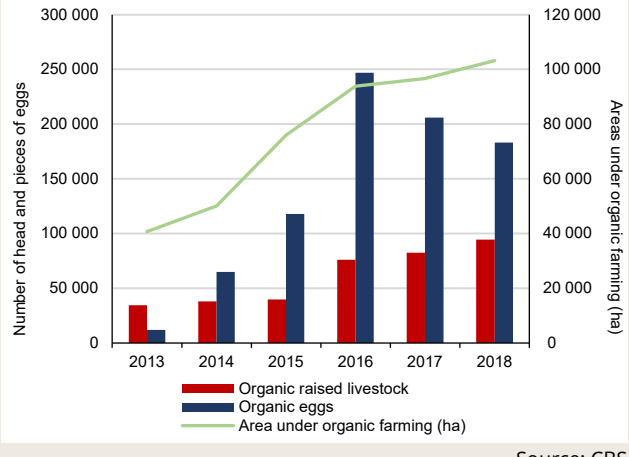
Source: Hrvatske šume

Organic farming contributes to the achievement of the European Union's goals[7] in the field of environment, climate, conservation of biodiversity and natural resources with the application of production standards and respect of animal welfare measures.

Trend and current state

In 2018, 4 742 entities were registered in the Register[8], and the share of areas under organic farming in total agriculture areas was 6.9%. Aid is granted through measures of the Rural Development Programme[9], in particular Measures No.11 Organic farming and No. 3 Quality schemes for agricultural products and foodstuffs. In 2018, organic farming took place on 50 281 ha of arable land, fruit production on 10 390 ha, vines on 1 002 ha, olives on 1 872 ha, medicinal plants on 3 939 ha, vegetable production on 422 ha, while meadows and pastures occupied 39 575 ha, and nurseries 27 ha. Of domestic animals, sheep (62 315 head) and bovine animals (19 613) were the most organically reared, followed by goats (4 199), equidae (2 388), pigs (1 887) and poultry (1 870) and bees (2 022 hives). Organic egg production grew from 12 000 pieces in 2013 to 183 000 in 2018. Like most EU-28 countries, Croatia meets its needs for organic food partly from third countries, and in 2017 the import of these products amounted to 1 016 269.07 EUR. The annual value of the Croatian market for organic products amounted to around 100 million EUR, and the share of consumption in total consumption was 2.2%. The average value of organic food consumption per capita in Croatia is 23 EUR, which is three times less than EU-28 average.

Organic farming production



Source: CBS

7 Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and of the Committee of the Regions "Thematic Strategy for Soil Protection" (COM(2006)231 final)
8 https://poljoprivreda.gov.hr/istaknute-teme/poljoprivreda-173/poljoprivreda-175/ekoloska/popis-subjekata-u-ekoloskoj-poljoprivredi/208
9 https://ruralnirazvoj.hr/program/

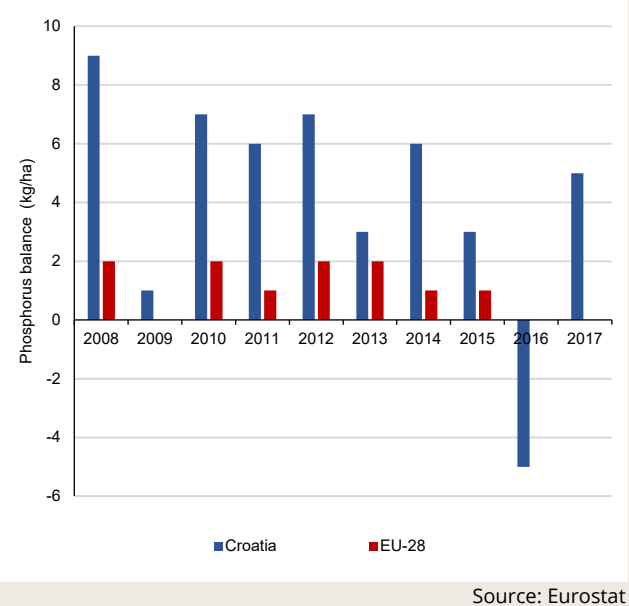
In agricultural production, it is important to maintain the gross nutrient balance needed for plant nutrition so that the soil is not depleted, while avoiding the accumulation of excess nutrients that are a potential source of emissions into the environment, especially nitrogen and phosphorus. Excessive nitrogen fertilization reduces yields and can lead to nitrate leaching and groundwater contamination on permeable soils. Also, higher amounts of phosphorus accelerate plant metabolism, which causes shorter crop vegetation, premature flowering and aging of plants, and thus shortens the period of fruit formation or grain filling.

Trend and current state

The gross nutrient balance is monitored in accordance with the Water Framework Directive (2000/60/EC) and the Nitrates Directive (91/676/EEC). Data collected from multiple sources include fertilizer consumption, livestock population, and production and crop areas. Included land categories are: arable land, permanent crops and permanent grasslands. The unit of measure used is kg of nutrients per hectare. The value of excess nitrogen for Croatia in the last five years (2013-2017) is approximately at the EU-28 level and amounts to about 50 kg/ha. During the last few decades of the last century, the excess of phosphorus in the agricultural soil of Croatia often occurred due to excessive fertilization with phosphate fertilizers. From 2013 to 2017, the excess of phosphorus is around 2 kg/ha, which is the average of the EU-28 countries.

These data show that further efforts are needed to achieve the targeted gross nutrient balance in Croatian soils.

Phophorus balance in Croatian soils



Source: Eurostat

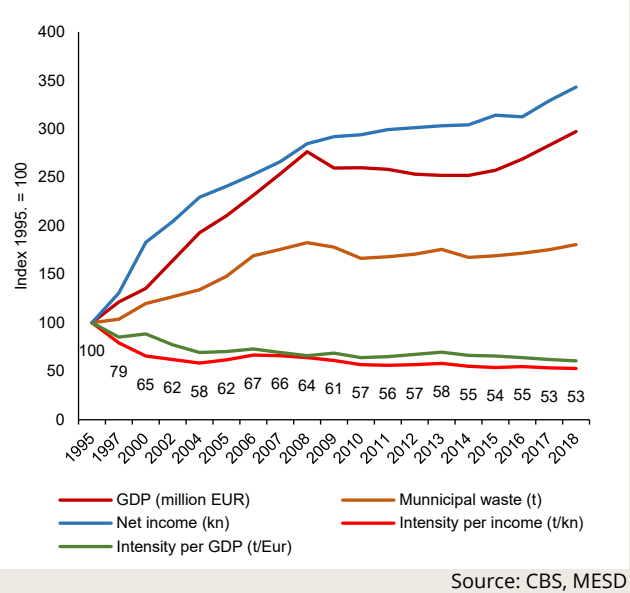
Waste generation intensity is an indicator that monitors the achievement of the goal of decoupling economic growth from waste generation, and it is presented as the ratio of generated waste and gross domestic product (GDP). When considering the intensity of municipal waste generation, the connection between the generation of municipal waste and the increase in consumption is observed, so in addition to GDP, the net salary is also used.

Trend and current state

The strategic goal[10] of decoupling the generation of municipal waste from economic growth that can be expressed through household consumption, has not been achieved. In 2018, GDP amounted 12 044 EUR per capita, the average net salary was 6 242 HRK per employed inhabitant, and the amount of municipal waste produced was 412 kg per capita. Citizens' consumption and overall economic development are growing somewhat faster than the growth of municipal waste. In the last ten years, the total intensity of municipal waste generation has decreased by 11%. At EU-28 level, there is also clear decoupling of waste generation from household consumption. Further reduction of municipal waste generation intensity could be achieved by directing society towards sustainable use of resources in consumption and production, implementing waste preventing measures including reuse of products and materials, and especially by implementing educational and information activities at the local level. Priority waste flows to which activities in the field of municipal waste need to be directed are bio-waste and food waste, packaging and electronic waste.

10 Sustainable Development Strategy of the Republic of Croatia, OG 30/09

Waste generation intensity



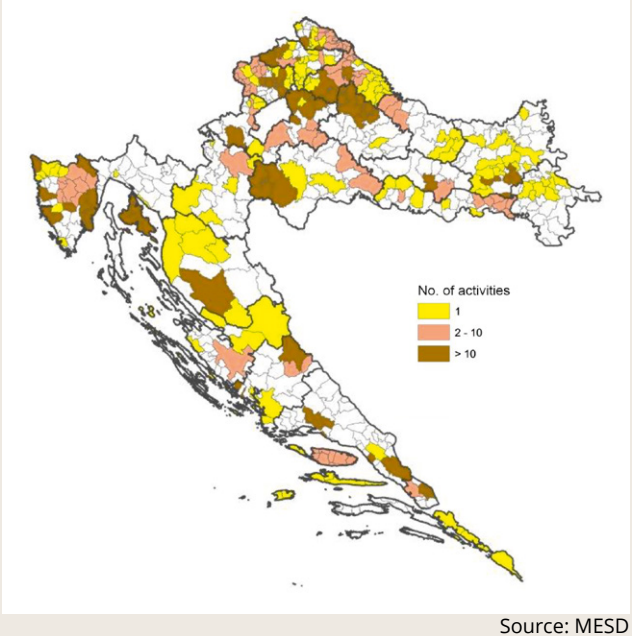
Source: CBS, MESD

In order to monitor information on possible measures and implemented waste prevention activities, the MEPP has established a Waste Prevention Portal (Portal)[11] including an application for reporting and reviewing projects and activities of local self-government units (LGUs) aimed at preventing municipal waste or reusing it. The opportunity to report examples of good practice in waste prevention is also given to the representatives of the business sector and non-government associations.

Trend and current state

From July 2017, when the Portal was established, until March 2020, total of 166 projects and 500 activities in the field of municipal waste prevention were reported. The largest number of activities was conducted within the Program of educational and informative activities on sustainable waste management, co-financed by the Environmental Protection and Energy Efficiency Fund (EPEEF). Leaflets, radio commercials and printed guides and brochures mainly carried out these activities. The most active local government was Lepoglava with 12 projects and 18 waste prevention activities.

Projects and activities conducted in prevention of waste generation in LGUs



Source: MESD

11 http://sprjecavanjeotpada.azo.hr

The production of electricity from the renewable energy sources (RES)[12] reduces greenhouse gas emissions and increases the energy sustainability of the system, which is one of the primary goals of European environmental policy. Since 2013 a financial boost to encourage the production of electricity from RES is prescribed by law[13].

Trend and current state

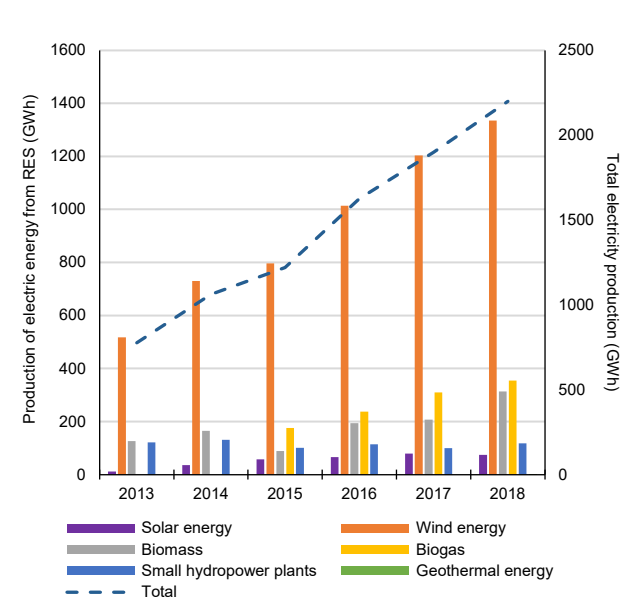
By increasing of the installed capacity, production of electric energy from RES is continuously growing from 776 GWh in 2013 to 2 196 GWh in 2018, when the share of RES was 16% in total electricity production (excluding large hydropower plants). Thus, for example, the installed wind power has been increased by more than three times. For the same reason, the production from biomass and biogas is growing[14] so in 2018 it makes 30.4% of the total production of electricity from RES, while in 2013 that share was 16%. In 2013, the share of RES in the production of electricity from solar energy was 1%, and in 2018 it was 3%. Geothermal energy in 2013 was not included in electricity production, but in 2018 for the first time 2 GWh of electricity was produced, which is 0.09% of the total electricity production from all RES.

12 RES are: solar, wind and geothermal energy, as well as energy produced from biomass, biogas and hydropower (small hydropower plants).

13 Regulation on Encouraging the Production of Electricity from Renewable Energy Sources and High-Efficiency Cogeneration (OG 116/2018)

14 Until 2014, data for biomass and biogas were presented together, and from 2014 they are presented separately.

Production of electric energy from RES



Source: EIHP

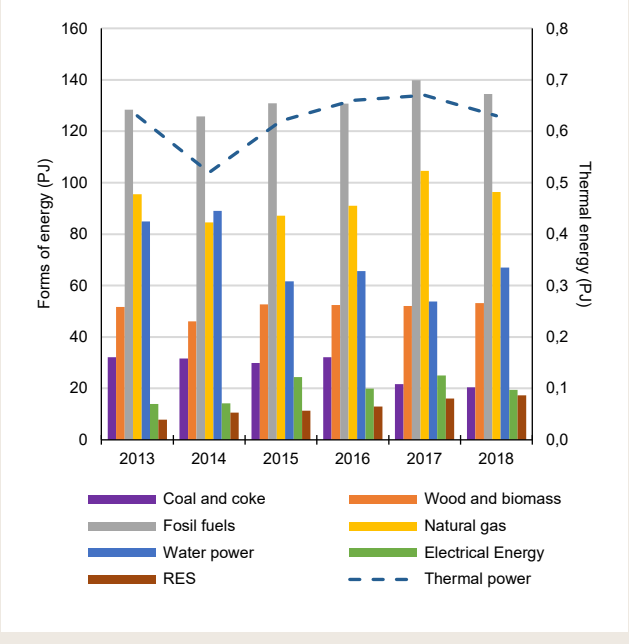
Higher energy consumption can be linked with a higher state developement. However, depending on the source, energy may have a higher or lower impact on the environment. More environmentally friendly sources of energy are all renewable energy sources (RES), and forms of energy that have less environmental impact than fossil fuel energy such as natural gas, water energy, solar energy and wind power energy.

Trend and current state

In period form 2013 to 2018, total energy consumption decreased at an average annual rate of 0.3%, which can be partly attributed to energy use efficiency. In the observed period, the trend of decreasing consumption of coal and coke from 8% in 2013 to 5% in 2018 was recorded. In observed period, the use of water power was also reduced from 21% to 16%. Energy consumption from other renewable energy sources[15] has increased as much as 17% annually, as a consequence of the increase in installed capacity, related to Croatia's commitment to develop the energy sector in this direction. Thus, on an annual basis, electricity production from these sources increased by 7% annually, from liquid fuels by 0.9%, from wood and biomass by 0.6%, from natural gas by 0.2%, and from water power 0. 1%.

15 Other renewable energy sources are wind energy, solar energy, biogas, geothermal energy.

Total energy consumption



Source: EIHP

Industry

Emissions into the air from industrial sector

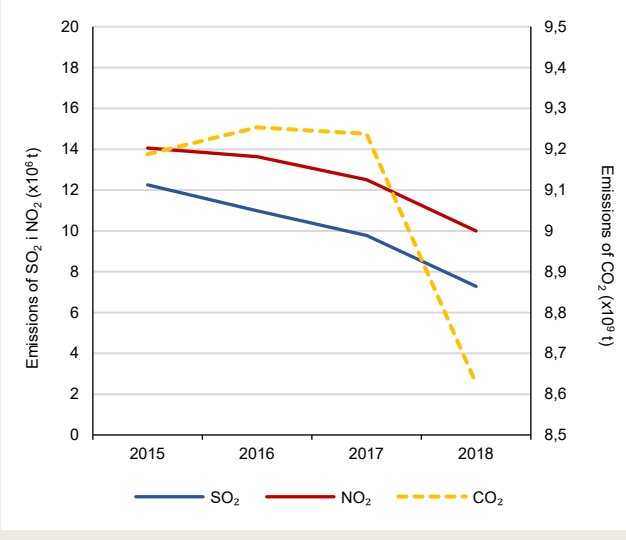
Emissions of carbon dioxide (CO_2), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) mainly related to the fossil fuels combustion, are the primary cause of acidification of the soil and eutrophication of aquatic and marine ecosystems. This pollutanst have a negative effect on the climate and detrimental effect on the respiratory organs of living beings.

Trend and current state

According to data reported to the Croatian Environmental Pollution Register, the main sources of carbon dioxide (CO_2), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) emissions from industrial sector were production of electricity, refinery fuel production, nitrogen fertilizer production and the mineral industry.

In 2015, SO_2 emissions were 12.3 × 10^6t, while NO_2 emissions were 14.1 × 10^6t and showed a steady decrease trend over the observed period. Emissions of CO_2 reached their highest value in 2016 (9.3 × 10^9t), and have been sharply reduced since 2017 due to replacement and reduction of fuel oil use with natural gas consumption and increased use of biomass. In order to continue this trend of reducing emissions from industrial sector, it is necessary to encourage the transition to alternative and cleaner technologies (e.g. biogas facilities), and to further encourage the use of renewable energy sources by reducing of fossil fuels use. Additional mechanisms are, for example, the emissions control during and after the combustion of fuel and application the filters at air emissions.

Emmissions of CO_2, NO_2 and SO_2 in the air from industrial sector



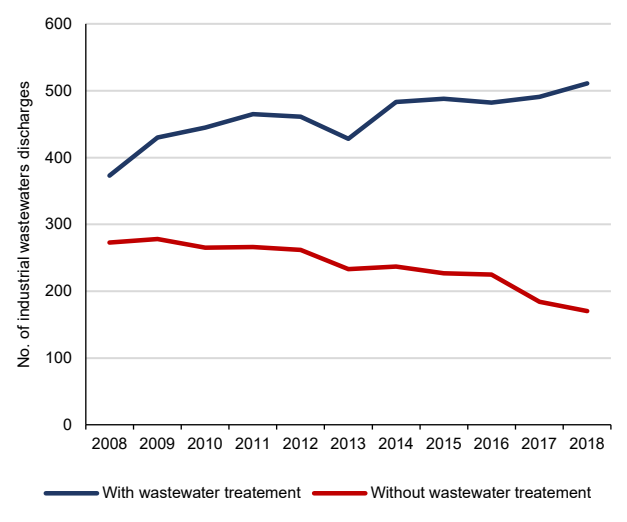
Source: MESD

All pollutants discharged into the waters are a threat to aquatic ecosystems and must be removed at the very source of the pollution. Of particular concern are those with potentially harmful effects on human health, such as endocrine disruptors and heavy metals[16]. Therefore, industrial wastewaters are treated before being discharged into a receiver or into a public sewer system. Purification methods could be based on physical, chemical and biological processes, or so-called combined processes of a few of them and thermal relief.

Trend and current state

According to the data available in Croatian Environmental Pollution Register (CEPR), the number of industrial wastewaters discharges with wastewater treatement processes applied was increased in recent decades. Compared to 2008, 58% share of industrial wastewater discharges with some of the treatment processes was recorded, and in 2018 this share was increased to 75%. In the last two years, chlorides (inorganic substances) and hard volatile lipophilic substances (organic substances) were the most represented substances released from the industry, and iron was the most released substance among metals. In the last decade, progress has been made in reducing the release of pollutants into water. However, it is still necessary to implement other measures to reduce the impact of industry on the environment, e.g. by appying advanced technologies and the principles of the circular economy.

Wastewater discharges in industry



Source: MESD

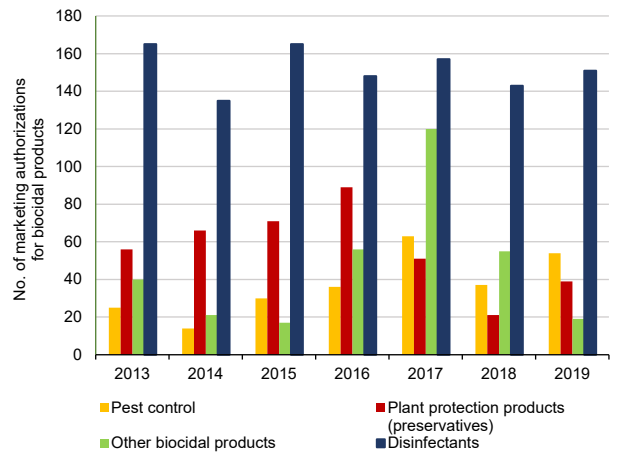
16 https://www.eea.europa.eu/publications/hazardous-substances-in-europes-fresh

Biocidal products[17] are used in public health for disinfection, disinsection, pest control and deodorization, for personal hygiene maintaining, protection of materials and for other purposes. With the approval of the active substance of a product required on EU level, their placing on the market requires prior marketing authorization, in accordance with Regulation (EU) No. 528/2012[18] and the Biocidal Products Act[19]. Marketing authorization for placing on the market and use of biocidal products in the territory of Croatia is issued by the Ministry of Health, which also maintains a Register of Biocidal Products[20].

Trend and current state

According to the Ministry of Health, from 2013 to 2019, most marketing authorizations were issued for disinfectants, with an average of about 53% of all biocidal authorizations issued. These are widely used products for disinfection in the areas of food, drinking water, personal hygiene and veterinary medicine. The number of approvals for disinfectants is followed by approvals for preservatives (preservatives for finished products, wood, materials and refrigeration systems and slimicides) with an average proportion of about 19% and approvals for groups of other biocidal products, mainly related to fouling agents in water (15%). The least approvals were granted for pest control agents (insecticides and repellents), with a share of 12%.

Number of marketing authorizations for biocidal products



Source: MZ

17 Biocidal products are active substances and preparations containing one or more active substances, prepared for the purpose to destroy, deter, render harmless, prevent, or control any harmful organism by chemical or biological means.

18 Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products

19 OG 63/07, 35/08, 56/10, 39/13

20 Register of Biocidal Products, accessed on May 2019

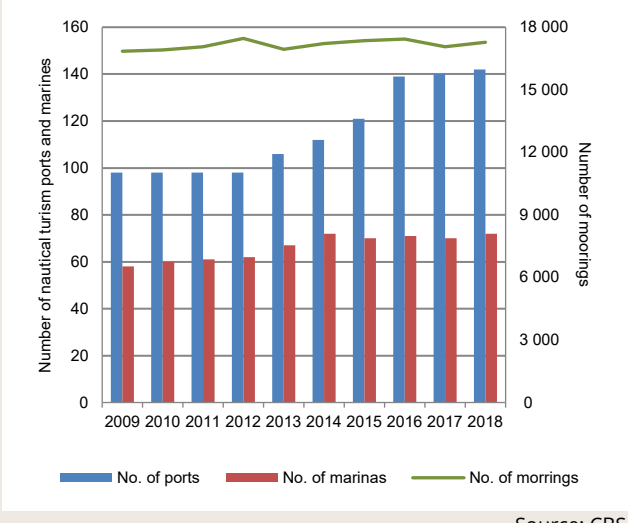
Over the last ten years, nautical tourism in Croatia has been developing strongly which is especially evidenced by the significant increase in the number of ports of nautical tourism and the number of moorings.

Trend and current state

Compared to 2009, the number of ports increased by almost 50% (in 2018 number of ports was 142). In the same period, the number of marinas increased from 58 to 72. Compared to 2009, the number of moorings increased by 426, so in 2018 there was total of 17 274 moorings. In 2018, the ports of nautical tourism area spread overall 4 075 400 m^2.

The development of nautical tourism has a number of positive economic effects, but from the environmental point of view, nautical tourism can have adverse effects such as sea pollution and degradation of the coastal ecosystem, as evidenced for example, by a decrease of seawater quality and an increase in concentrations of hazardous substances. Therefore, in the course of development and planning of the existing and construction of new nautical tourism ports, it is necessary to determine the environmental capacity of the site and, therefore, ecological value and to conduct the environmental impact assessment. Data on noise, vibration and pollution in the site of nautical turism ports are currently unavailable, as no control system has been established.

Ports of nautical turism, number of marines, number of moorings



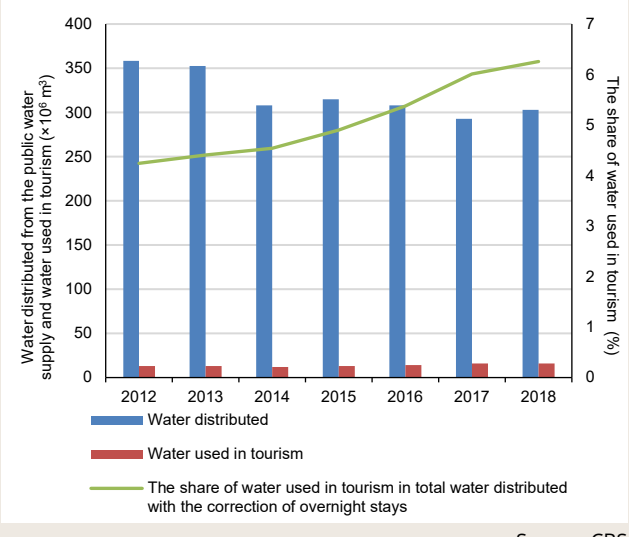
Source: CBS

During the summer tourist season, water consumption has increased, which significantly burden the water utility infrastructure, especially in the coastal counties of Croatia. Namely, as much as 96% of tourist overnights stays are recorded in the coastal part of the country. Given the short summer seasonal period that is mostly dry and with a low amount of precipitation, there are challenges in the water supply and water protection in the coastal area. The estimation of water consumption in tourism is based on data on the amount of water delivered to the population and the number of tourist overnnight stays, and the number of Croatian residents is taken into account. According to EUROSTAT recommendation, for assessment it is necessary to correct the data for 20% up because of the informal economy - the unregistered part of tourist traffic, especially in private accommodation.

Trend and current state

From the period of 2012 to 2018, the volumes of total water distributed from the public water supply decreased by 18% (from 358.3 million m^3 in 2012 to 302.9 million m3 in 2018), as a result of reduced water consumption in households and in the economy. On the other hand, the number foreign tourist's overnight stays increased significantly (by 44%). This trend has led to an increase in the share of water used in tourism in the total water distrubuted at the national level, with a correction of 20% overnight stays in 2018 to 6.2%. If the trend of increasing this share is observed, it can be said that it is corelated to an increase in the number of overnight stays of foreign tourists and is growing aproximatively 48% in the observed period.

Water consumption in tourism



Source: CBS

Transport

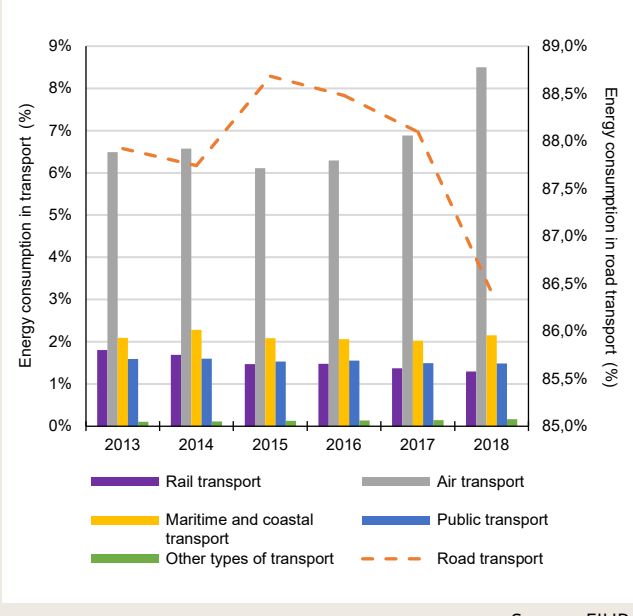
Energy consumption in transport

Transport affects the environment by releasing harmful substances into the air and water directly, but also indirectly due to the depletion of natural resources. Measures such as the improvement of fuel quality standards and the modernization of the road vehicle fleet has resulted in the reduction of pollutant emissions into the air.

Trend and current state

In the period from 2013 to 2018, total energy consumption in transport grew up 3% annually. The average annual rate of increase in energy consumption in air transport was 8.4%, while the consumption of energy in road transport increased at an average annual rate of 2.3%. The trend of increasing energy consumption in maritime and coastal transport has been achieved at an average annual rate of 3% and in urban public transport of 1%. Energy consumption of railway transport, which is considered as the most environmentally friendly, has been declining at an average annual rate of 4%. The transport sector also includes the transport of dangerous goods by pipeline (oil and its derivatives, natural gas), which grew at the highest annual rate of up to 12% over the observed period. However, looking at the trend of energy consumption in all types of transport, it is evident that after 2015 a desirable trend of its reduction is emerging, accompanied by a reduction in greenhouse gas emissions.

Energy consumption in transport



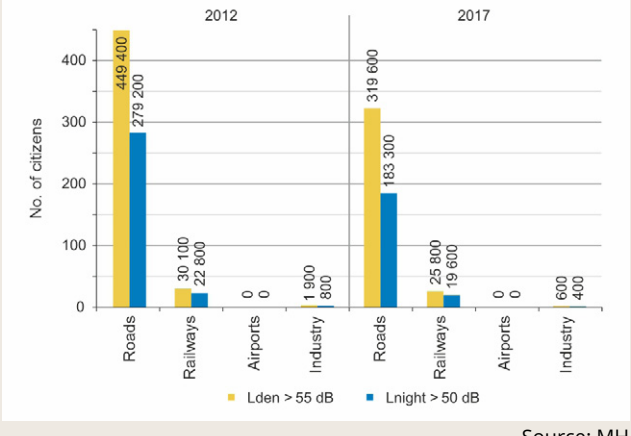
Source: EIHP

The World Health Organization (WHO) considers road traffic noise as the second most important cause of impairment of human health in Europe, after the air pollution caused by particulate matter. According to the Law on Noise Protection[21], environmental noise measurement is carried out in populated areas with more than 100 000 inhabitants exposed to environmental noise, coming from high-density road traffic, rail and air traffic, and industrial operations and facilities. To avoid, prevent or reduce the adverse effects of noise interference, data are monitored and exchanged with the European Environment Agency (EEA)[22], every five years, strategic noise maps are developed and environmental noise management action plans are adopted.

Trend and current state

Long-term exposure to noise can cause a wide variety of cardiovascular diseases, adverse metabolic and cognitive effects and disorders and serious sleep interferences and disorders[23]. As in other European countries, in Croatia in 2017, the main source of noise interference was road traffic. Environmental exposure values measured within populated areas in 2017 in the cities of Zagreb, Rijeka, Split and Osijek show that the population of exposed residents was 319 600, that is significantly less than in 2012 when the number of exposed residents was 449 400. In the same period, the number of inhabitants exposed to environmental noise from railway traffic and the noise of industrial operations and facilities was reduced in the area of the mentioned cities, while there were no exposed environmental noise coming from airports in Croatia.

Population in areas with more than 100 000 inhabitants (Zagreb, Split, Rijeka, Osijek) exposed to noise overdose Lden > 55 dB



Source: MH

21 OG 30/09, 55/13, 153/13, 41/16, 114/18

22 https://www.eea.europa.eu/themes/human/noise/noise-fact-sheets/noise-country-fact-sheets-2019/croatia

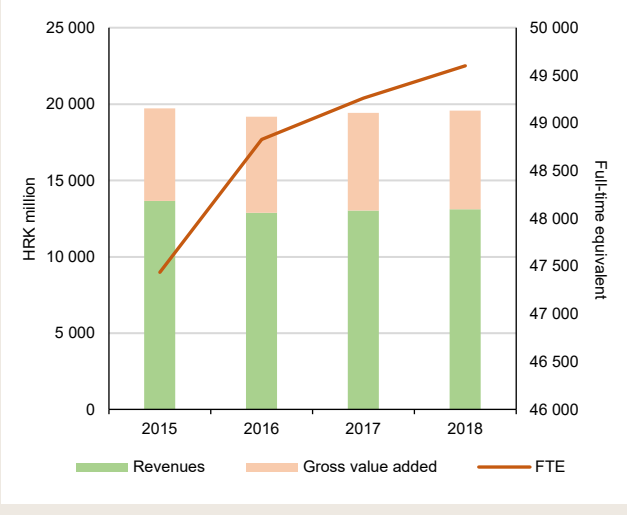
23 Noise indicator Lden (day-evening-night), maximum permissible values> 55 dB, the total noise nuisance is assessed, while the night noise indicator Lnight, maximum allowable value value> 50 dB, evaluates sleep disturbance.

The sector for environmental goods and services[24] includes those products and services aimed at preventing air and water pollution, preventing the degradation of biodiversity and landscapes and the depletion of natural resources. They are also intended to reduce waste and population exposure to noise, to reduce and eliminate treat and manage pollution and to perform activities such as measurement and monitoring, control, research and development, education, information and communication related to environmental protection or management of natural resources.

Trend and current state

The environmental goods and services sector (EGSS)[25] accounts show revenue, gross value added and the number of employees[26] in environmental and resource management activities. In Croatia, total revenues from these activities were the largest (13 664 million HRK). Although they have decreased in the following two years, in 2018 they increase to 13 122 million HRK. In 2018, gross value added was the highest and amounted (6 446 million HRK). Employment in this sector is also growing steadily, with 47 439 full-time equivalents recorded in 2015 and 49 601 in 2018 (an increase of 4.5%).

Environmental goods and services sector accounts in Croatia



Source: CBS

24 Another name for this sector is eco-economy or eco-industry.
25 Environmental goods and services sector; https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-GQ-16-011
26 Employees in environmental and resource management activities are reported in Full Equivalent Time (FTE).

Resource efficiency

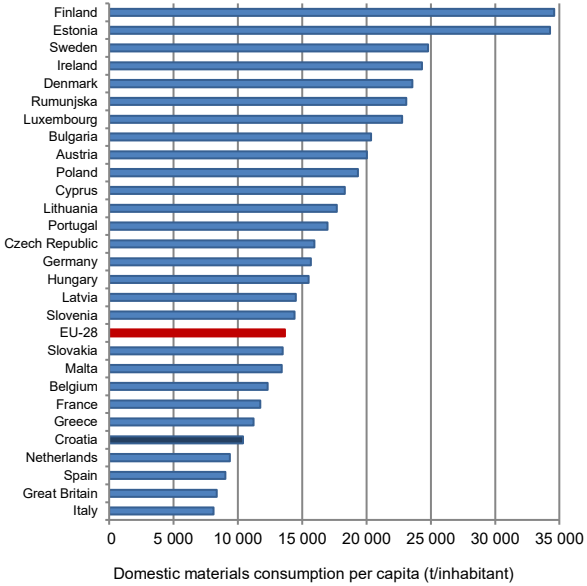
Domestic materials consumption

Domestic material consumption (DMC) is the total amount of material used directly in the national economy. It is calculated according to the EUROSTAT methodology[27] and represents the total annual amount of material resources exploited from the natural environment of the national territory (biomass, metal ores, non-metallic minerals, fossil fuels) except water and air, increased by total imports and decreased by total exports. DMC per capita is the indicator that allows the comparison of national domestic consumption of materials to the average of EU-28 and DMC values of other Member States.

Trend and current state

In 2018, DMC per capita in Croatia was 10 410 t/inhabitant, while the EU-28 average was 13 646 t/inhabitant. The higlhest DMC per capita in 2018 was recorded in Finland (34 595 t/inhabitant) and Estonia (34 266 t/inhabitant). The Member States with the lowest DMC per capita in 2018 are Italy (8 107 t/inhabitant) and the United Kingdom (8 349 t/inhabitant). This indicator belongs to a set of indicators intended to assess the resource efficiency and to monitor progress towards a resource-efficient economy in order to evaluate the achievement of one of the major European environmental policy objectives.

Domestic materials consumption per capita in Croatia



Source: Eurostat

27 Economy-wide material flow accounts

Sustainable consumption and production

Decoupling of economic growth from from environmental pressures

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Economic growth is inevitably accompanied by emissions of pollutants and greenhouse gases into the environment. Decoupling of economic growth from environmental pressures is an indicator that integrates economic data with data of environmental pressures, and is the basis for assessing whether economic growth (expressed as gross domestic product - GDP) is achieved while environmental pressures are reduced (greenhouse gas emissions, ozone precursors, acidifying substances).

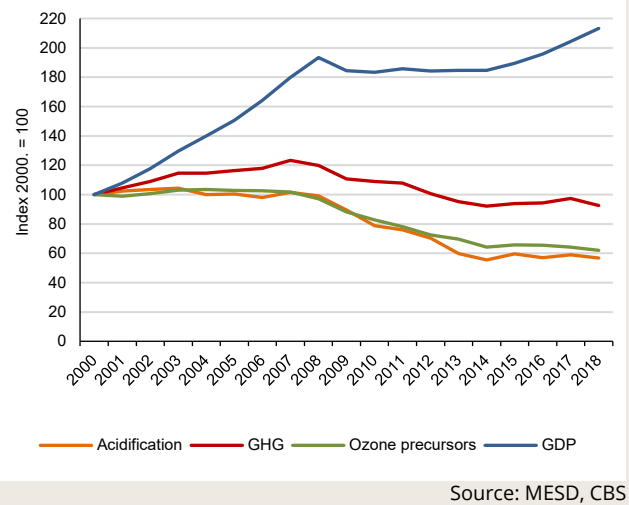
Trend and current state

Between 2000 and 2007, there was a relative decoupling of Croatia's economic growth from environmental pressures, caused by emission of pollutants in the air. This means that greenhouse gas (CO_2-eq), acidifying substances (SO_2-eq)[28]and ozone precursor (NMHOS-eq) emissions[29] are growing but far below growth of GDP. Since 2008, there has been a downward trend in CO_2-eq, SO_2-eq and NMVOC-eq emissions, but also a decline in GDP due to the impact of the economic crisis. Since 2012, economic growth has been recorded again, or more pronounced since 2015. The main objective of sustainable production and consumption is to achieve the absolute decoupling of economic growth from the emissions of pollutants in the environment that Croatia has achieved. This is largely due to implementation of environmental policies measures, but also because of the negative economic trends that began in 2008. These negative trends has resulted in decrease of industrial production and thus in reduction of the environmental pressures caused by air emissions.

28 Emissions of acidifying substances expressed as SO_2-eq were calculated using coefficient: NO_x 0.7; SO_2 1; NH_3 1.9.

29 Ground-level ozone precursor emissions, expressed as NMVOC-eq, calculated using factors: NO_x 1.22; NMVOC 1; CO 0.11.

Decoupling of economic growth from emission of pollutants in the air in Croatia



Source: MESD, CBS

Circular economy

Eco-innovation scoreboard

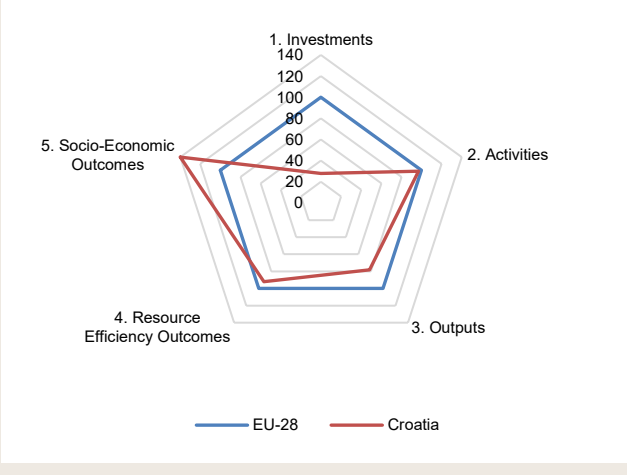
An eco-innovation scoreboard is a composite indicator showing the success of eco-innovation in the EU-28 Member States. It is created by using 16 indicators grouped into five areas: Investments, Activities, Outputs, Resource Efficiency Outcomes and Socio-Economic Outcomes. The results of each country are compared to the EU-28 average indexed as value 100. Insight into the development of eco-innovation promotes a holistic approach for linking economic, environmental and social trends to the sustainable transition of society[30].

Trend and current state

In 2018, Luxembourg (138), Germany (137) and Sweden (132) had the largest eco-innovation scoreboard. Eleven countries had a value of around EU-28 averages (100), and were designated as "average drivers of eco-innovation" with scores ranging from 112 (Italy and France) to 88 (Croatia). Looking at Croatia's performance in 2018 compared to 2017, progress has been made in four areas, notably in Socio-economic Outcomes (95 in 2017; 140 in 2018). Only results of Resource Efficiency[31] are in a slight decrease, from 97 in 2017 to 92 in 2018, indicating the need to improve material and energy productivity and reduce the intensity of greenhouse gas emissions.

Only significan improvement is in water productivity[32], from 133 and 2017 to 251 in 2018.

Eco-innovation scoreboard in Croatia



Source: EC, EIO

30 https://www.eea.europa.eu/themes/sustainability-transitions

31 Resource efficiency result indicators are: Material productivity, Water productivity, Energy production and Greenhouse gas emission intensity.

32 Water productivity is calculated as a ratio of gross domestic product and the water footprint of the country.

Abbreviations

CBS	Central Bureau of Statistics
CGI	Croatian Geological Institute
CO_2	carbon dioxide
DMC	Domestic Material Consumption
GDP	Gross Domestic Product
EC	European Commission
EGSS	Environmental Goods and Services Sector Accounts
EIO	Eco-innovation Observatory
ETS	Emissions Trading System
EU	European Union
EUROSTAT	European Statistical Office
EPEEF	Environmental and Energy Efficiency Fund
Gg	gigagram (10^9 g) = 1 000 t
GV	limit value
HŠ	Hrvatske šume d.o.o. (Croatian Forests - public company)
Lden	indicator of total noise interference for day-evening-night level
Lnight	Noise Indicator that Causes Sleep Disorders for the time period "night", lasts 8 hours from 11 pm to 7 am
LRTAP	Long-range Transboundary Air Pollution
LULUCF	Land Use, Land Use Change and Forestry
MH	Ministry of Health
MEE	Ministry of Environmental and Energy
NH_3	ammonia
NMHOS	non-methane volatile organic compounds
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
Pb	lead
PJ	Petajul (10^{15} J)
PM_{10}	Particle matter of aerodynamic diameter less than 10 μm
SO_2	sulfur dioxide

Glossary

- **Anthropogenic sources of pollution** – sources of pollution created by human activity.
- **Biomass** – living or, until recently, living matter, of plant or animal origin, which can be used as a fuel or for industrial production as a raw material.
- **Bio-waste** – kitchen waste (food preparation residues) and garden or green waste, accounts for almost a third of household waste and is a valuable raw material for the production of quality biocompost.
- **Biogas** – a gaseous fuel produced by anaerobic digestion or fermentation of organic matter, including fertilizers, sewage sludge, municipal waste or any other biodegradable waste.
- **Circular Economy** – a production and consumption model that involves sharing, borrowing, reusing, repairing, restoring and recycling of existing products and materials for as long as possible to create added value and reduce waste.
- **Emissions of acidifying substances into the air** – emitted pollutants that acidify the air: sulfur dioxide (SO_2), nitrogen oxides (NO_x) and ammonia (NH_3) and cause acid rain and thus acidify the ecosystem.
- **Endocrine disruptors** – natural and chemical substances that can alter the functions of the hormone system in humans and animals and thus adversely affect their health. They can be found in general use items, such as clothing, furniture, packaging and electronics. Many pesticides and herbicides contain chemicals that can affect the endocrine system of organisms in the ways described.
- **Eutrophication of aquatic and marine ecosystems** – changes in the ecosystem caused by the excessive rate of organic matter formation and its external intake. The causes are natural mechanisms and human influence (improper discharge of wastewater, intake of high concentrations of nutrients nitrogen and phosphorus).
- **Fugitive emissions** – emissions of volatile organic compounds into the air, soil and water, as well as solvents contained in any product, or occurring in production involving solvents.
- **Gothenburg Protocol** – one of the 8 protocols of the Convention on Long-range Transboundary Air Pollution. The Protocol regulates the issues of acidification, eutrophication and ground-level ozone, and sets the maximum emission levels for each State Party for the four major pollutants responsible for acidification, eutrophication and ground-level ozone: sulfur dioxide, nitrogen oxides, volatile organic compounds and ammonia.

- **Calcination of dolomite or magnesite** – part of a technological process in the production of lime and magnesium oxide in which dolomite or magnesite are annealed by annealing with a chemical change (burning of organic matter, oxidation of inorganic compounds, etc.).

- **Municipal waste** – household waste and waste similar in nature and composition to household waste, except production and agricultural and forestry waste.

- **Water productivity** – an estimate (indicator) of the efficiency of water use as a natural resource, calculated as the ratio of the gross domestic product to the water footprint of each country.

- **Slimicides** – products used to prevent or control the formation of mucilage on materials, equipment and structures used in industrial processes, such as wood and paper pulp, on porous sand layers during oil extraction.

- **Greenhouse gases** – gases that cause the greenhouse effect in a planetary atmosphere, with carbon dioxide (81%) being the main byproduct of most human activities and burning fossil fuels, while methane (11%), nitrous oxide (5%) and hydrofluorocarbons (2%) emit in smaller quantities, but they heat the earth much more efficiently than carbon dioxide.

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