The Environment in Your Pocket I-2019

REPUBLIC of CROATIA
Ministry of Environment
and Energy

Impressum

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The Environment in Your Pocket I – 2019

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Basic data on the Republic of Croatia

Mainland surface area	56 594 km^2
Territorial sea and internal sea waters	31 479 km^2
Coastline length	6 278 km
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	4 089 400
Population density per km^2, 2017	72,9
Inhabited islands	47
Language	Croatian
Script	Latin
Political system	Parliamentary democracy
GDP per capita 2018	12 594 EUR

Introduction

Dear readers,

you hold the jubilee 15th edition of the publication *The Environment in Your Pocket*, widely known as comprehensive and simple overview of environmental indicators particularly among the scientific and professional public. This publication is released in order to mark World Environment Day on 5 June, as Croatia is included in the global campaign of the United Nations to encourage and public and decision-makers to think about, and act on behalf of the environment. This year's slogan puts a hot topic at the forefront "Breathe life – clean air, healthy future"[1] and the expected outcome is a proactive community approach aimed at reducing the impacts of air pollution on human health and on the climate.

Understanding the scope and impacts of air pollution is the first step in protecting human health and welfare, particularly in urban areas. According to UN estimates, only 1 in 10 people breathe air that complies with the quality guidelines of the World Health Organisation. Furthermore, in the period from 2008 to 2013 it was estimated that air pollution have increased by 8% at the global level in urban areas, where measurements have been established.

In recent years, the emission of pollutants in the air in Croatia has been visibly declining. However, emissions from transport have increased, indicating the need for a shift towards energy and environmentally effective solutions for the transport of people and goods. Therefore, in addition to implementing programmes and projects for energy efficiency, it is also necessary to consider the introduction of inter-modal transport, such as integrating rail transport into city and suburban public transport, and shifting public parking lots and garages towards the periphery.

The highest contributor to total greenhouse gas emissions, which have also been declining in recent years, is the energy sector, i.e. the production of electricity and heat energy and transport, followed by the industrial sector. Croatia is continually increasing its share of energy from renewable sources, and this energy, including hydro power, accounted for about 28% of the total energy generation in 2017. Furthermore, incentives for energy efficiency in transport are also becoming more intensive, with 103.24 million HRK invested in

1 http://breathelife2030.org/

this area, of which about 87 million HRK[2] was for the co-financing of electric, hybrid and plug-in hybrid vehicles. In several Croatian cities where air pollution levels have exceeded the limit values, measures of the action plans to improve air quality are being implemented, whereby Croatia has taken significant activities needed to reduce air pollution and its potential impacts on health and the climate.

Positive shifts are also seen in the areas of sustainable waste management, and in the local self-government units, where infrastructure is being installed for more efficient waste management, all with the aim of reducing waste generation, reducing the deposition of waste at landfills and increasing sorted collection and recycling.

There are many areas where sustainable consumption and production can be stimulated, such as organic farming and sustainable waste management, which is closely associated with the circular economy - a focus activity for all EU-28 Member States. The global character of the ecological challenges implies fundamental changes in many social systems, particularly those pertaining to food and energy supply, and those associated with increasing mobility and construction of sustainable housing and transport infrastructure. In the transition towards a sustainable society, changes in behaviour patterns among manufacturers and consumers alike will be of critical importance.

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2 HRK – Croatian kuna; Currency rate 1 HRK = 0,134820008 EUR

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Air

Air quality in Croatia

For the purposes of air quality monitoring, a Regulation[3] divided Croatia into five zones and four agglomerations. Particulate matter ($PM_{10}$and $PM_{2.5}$) consists of very fine particles of dust and heavy metals, nitrates, sulphates, and biological components that are detrimental to the respiratory system. Nitrogen oxides (NOx) cause acidification, eutrophication and the creation of ground-level ozone.

Trend and current state

In 2016, the limit values of PM_{10} were exceeded in the agglomerations Zagreb and Osijek, and in the larger towns in the industrial zone: Sisak, Kutina and Slavonski Brod. Due to this pollutant, the air quality was category II (polluted air). The dominant sources of pollution with PM_{10} particles is home heating and transport. Even though NOx emissions were down 50% in comparison to 1990 levels, the limit exceedances in 2017 in Zagreb were recorded at measuring stations near roads. The dominant source of NOx is fuel combustion in road transport (48%), and these emissions are due more to the state of technology than to fuel quality. All these towns have drafted action plans to improve air quality.

3 Regulation on the determination of zones and agglomerations according to air pollution levels in the territory of the Republic of Croatia (OG 1/14)

Air quality based on limit values (LV) of PM_{10}

Source: MEE

Ground-level ozone

Ground-level ozone is an integral part of city smog. It is formed in the troposphere through complex photochemical reactions from the compounds NOx, NMVOCs, CO and CH_4, known as ozone precursors. Excessive accumulations of ozone in the lower layers of the atmosphere can cause respiratory difficulties in people and can have a detrimental effect on the growth of forests and crops. It also presents a significant problem in larger cities with high traffic load, and along the coast, particularly in the hot, dry, summer months. Ground-level ozone is one of the most significant global problems we face today, as its relatively long persistence in the atmosphere enables its transmission over long distances.

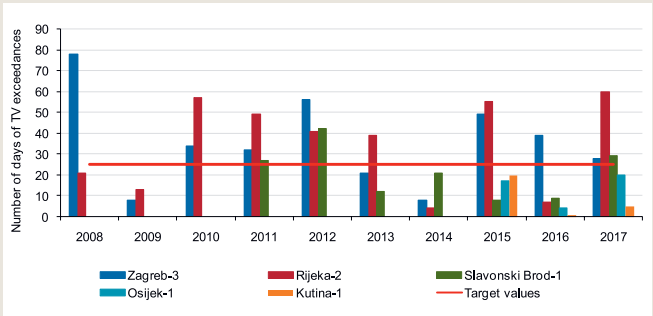
Trend and current state

Due to its geographic position and the distance transport of ground-level ozone and its precursors from Western Europe, and due to the meteorological conditions (dry, hot summer days with high insolation), Croatia is exposed to occasional episodes of increased ground-level ozone concentrations. In the period from 2008 to 2017, ground-level ozone concentrations measured using the national network for continuous air quality monitoring exceeded the target values (TV)[4] at the measurement stations Zagreb-3 and Rijeka-2.

4 TV 120 μg/m³, permitted 25 times per year

The measurement station Slavonski Brod-1 recorded exceedances of target values in 2012 and 2017, while the measurement stations Kutina-1 and Osijek-1 showed ground-level ozone levels below the target values.

Number of days of TV exceedances for ground-level ozone in inhabited areas



Source: MEE

Air

Persistent organic pollutants (POPs)

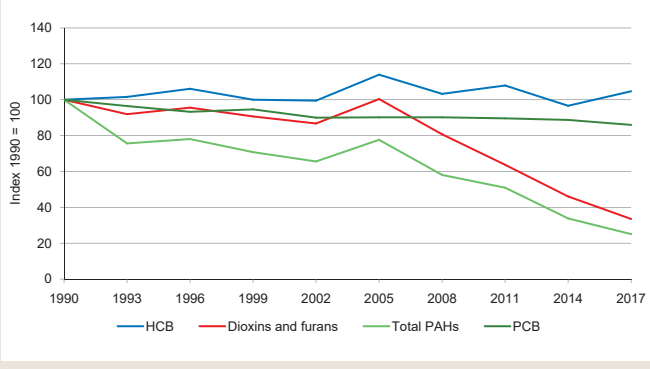
Persistent organic pollutants (POPs) are toxic compounds resistant to chemical, photochemical and biological degradation. Sources include burning of biomass in small furnaces, fuel combustion in industry, emissions from the construction sector, and waste incineration. Since they are absorbed by atmospheric particles, this form of pollution can spread far from the source of the emission. They accumulate in living organisms and in the food chain, and present a threat to human health. Croatia is a party to the Protocol[5] to the Convention of Long-range Transboundary Air Pollution, which requires the monitoring of concentrations and annual calculations for three groups of POPs: dioxins and furans, polycyclic aromatic hydrocarbons (PAHs), and industrial chemicals: HCB (hexachlorobenzene) and PCB (polychlorinated biphenyls).

Trend and current state

In relation to the reference year 1990, the emissions of dioxins and furans in 2017 was 16.2 g I-TEQ[6] (a 66% reduction), and the emission of PAHs was 5.9 t (a 74.9% reduction). According to the Protocol, Croatia did not meet its target for HCBs in 2017, since the emissions exceeded the 1990 baseline by 3.4% (0.28 t). This exceedance is the consequence of the increased consumption of biomass in the sector of small heating, especially in households. In recent years, there has been an increasing trend for the use of biomass to heat homes, particularly due to the relatively low cost of that form of heating, and due to the policies to reduce greenhouse gas emissions, since the combustion of biomass releases no CO_2 emissions.

5 Act on Ratification of the Protocol on Persistent Organic Pollutants to the Convention on Long-range Transboundary Air Pollution from 1979 (OG-IA 5/07)
6 International Toxic Equivalent

Trend of emission of persistent organic pollutants



Source: MEE

Climate change

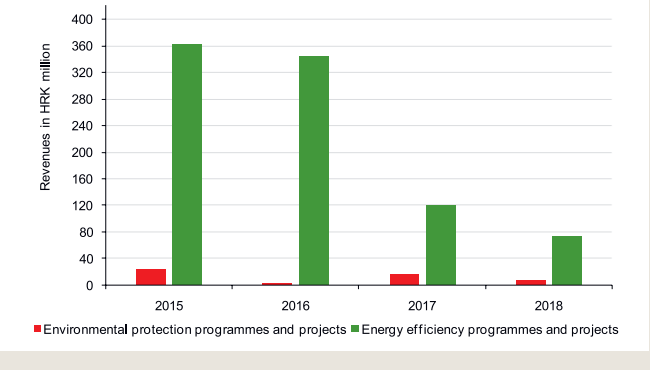
EU Emissions Trading System in Croatia

Since 1 January 2013, Croatia has been a part of the EU Emissions Trading System (EU ETS[7]) which is used for trading of greenhouse gas emissions units, and for conducting auctions using the European Union joint auctions platform. Auctions are an effective means to distribute quotas across the market in line with the "polluter pays" principle, which stimulates installation operators to consider the costs of emissions in their business decisions.

Trend and current state

Revenues from auctioning off quotas allocated to Croatia have dedicated uses, above all for the reduction of greenhouse gas emissions and adapting to climate change. The funds are used in accordance with the Plan for the use of revenues from the sale of emission units at auction, adopted by the Government of the Republic of Croatia. The revenues generated in 2015, which included the auction units from 2013 and 2014, amount to 386.5 million HRK in total. In 2016, the revenues amounted to 347.5 million HRK then dropped, to 136.6 million HRK in 2017 and rised again in 2018 to 503.5 million HRK. In general, more than 90% of these revenues are used to fund programmes and projects for energy efficiency, including the refitting of family homes, housing buildings and public buildings, stimulating cleaner transport and the use of renewable energy sources. The remaining funds are put into financing of environmental protection programmes and projects, such as the protection, conservation and improvement of quality of air, soil, water and sea, preventing waste accumulation, etc.

Funds spent on energy efficiency and environmental protection programmes and projects, financed from the ETS funds



Source: MEE

7 EU Emission Trading System

Climate change

Annual precipitation trends

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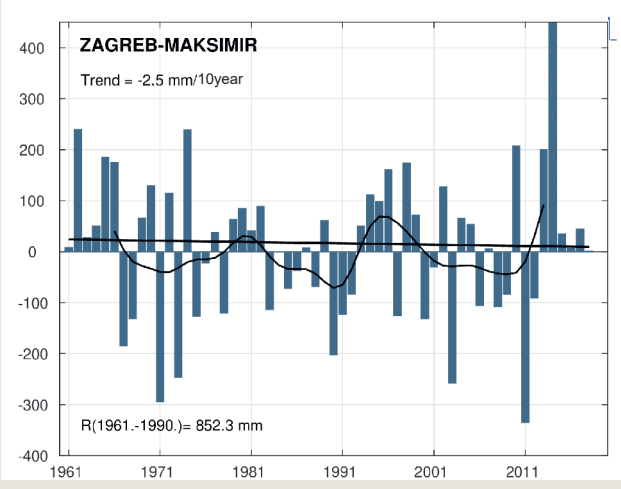
Indicators follow the trends of annual precipitation at specific meteorological stations, with an available data series since 1961. The trend of annual and seasonal precipitation in Croatia over this 58-year period indicate no significant changes over time.

Trend and current state

In the continental interior (Zagreb-Maksimir), an insignificant reduction in the annual level of precipitation was observed (- 2.5 mm / 10 years), which is the result of less precipitation in the warmer part of the year (spring and summer), while precipitation is higher in the colder part of the year (autumn/winter). On the Adriatic coast (Split-Marjan), a negative trend in precipitation was observed (-12.8 mm / 10 years), and is present in all seasons except autumn. On the other hand, in eastern Slavonia (Osijek) and in the mountains (Gospić), annual precipitation levels have experienced a slight increase (4.4 mm / 10 years; 2.5 mm / 10 years, respectively), due primarily to an observed increase in the amount of autumn precipitation.

Variations from the annual precipitation levels and the 11-year binomes of sliding means and trends for the period 1961–2016



Source: DHMZ

Inland waters

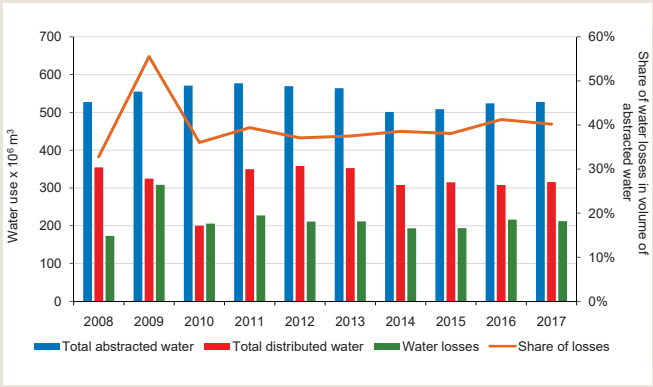
Effective use of waters

The public water supply includes the capture of ground and surface waters intended for human consumption and for the supply of economic entities and institutions, primarily for sanitary purposes and in part for technological purposes. Given the quantity of water captured and the recorded losses in the water supply system, it is necessary to ensure the sustainable use of the nation's water resources.

Trend and current state

According to the data of the CBS, the average capture of water is 542 million m^3 per year, while total losses are about 215 million m^3 (40% of the average capture). Significant losses in the water supply system are the consequence of technical misfunctions or faults in the water supply network. Losses also include those captured quantities of water whose use is not subject to payment (e.g. municipal uses, fire protection). These data indicate an unsatisfactory effectiveness of water use, since the portion of the actual supplied quantity is only 60%. Water management has the strategic aim to gradually reduce water losses to an acceptable level of 15 to 20%.[8] Today, 84% of the population is hooked up to the public water supply system,[9] with more than half of the delivered quantity of water used to service that sector (178 million m^3 supplied to households in 2017), while the remainder went to supplying the economy and other sectors (77 million m^3 to the economy, 60 million m^3 to other sectors).

Annual quantities of captured and supplied water, with share of losses



Source: CBS

8 Water Management Strategy
9 Water Region management plans 2016-2021

Inland waters

Risk of incompliance of good chemical status of groundwater bodies in Croatia

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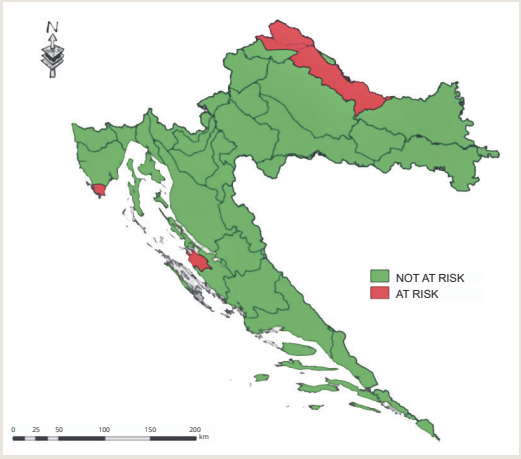
The assessment of the risk of incompliance of good chemical status of groundwater bodies (GWB) in Croatia for the period 2016 to 2021 was made on the basis of monitoring data, including the chemical condition, data on pressures, and natural vulnerabilities. The "precautionary principle" was applied, meaning that a certain water body can be at risk, even though it is currently in good condition. All water bodies with a poor assessment of their condition are also at risk of failure to meet the target of achieving "good chemical status of groundwater bodies".

Trend and current state

In the Pannonian region, the GWBs Međimurje, Varaždin and Legrad-Slatina are at risk due to occasional increases in nitrate concentrations, primarily from agriculture (flat pollution sources). More than 60% of the GWB Međimurje and more than 90% of the GWB Varaždin fall within vulnerable and very vulnerable areas, and more than 60% of GWB Legrad-Slatina falls within areas of increased to very high vulnerability. In addition to the established pressures from flat pollution sources, there is also a risk from point sources of pollution (landfills, emissions of treated and/or untreated wastewaters). During the assessment of the chemical state of the GWB Southern Istria and GWB Bokanjac-Poličnik, found in the karst landscape of coastal Croatia, it was determined that they are in poor condition, and therefore, based on the "precautionary principles", were immediately included in the risk category.

Risk of incompliance of good chemical status of groundwater bodies



Source: Hrvatske vode

Soil and land

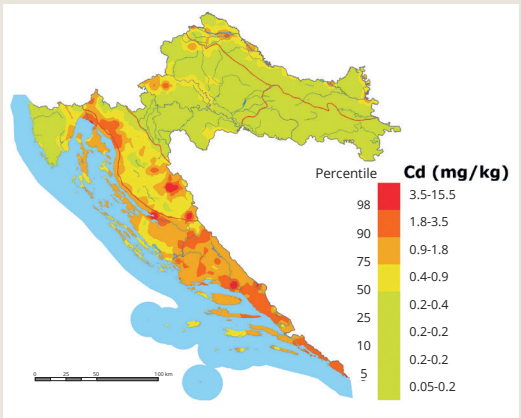
Soil pollution with cadmium

In concentrations above the permitted values, heavy metals represent pollution that can threaten the balance of the ecosystem and ultimately affect human health. In addition to entering the food chain, in the form of free ions, soil solutions can penetrate into surface and ground waters. The presence of heavy metals in the soil can be of natural origin, or can be the consequence of human activities.

Trend and current state

Cadmium (Cd) is one of the most harmful heavy metals for the living world. It quickly accumulates in crops, especially in acid soils. Sources of this pollution can be lead or zinc mines, transport, mineral fertilisers and pesticides. The range of cadmium concentrations in the soil in coastal Croatia is from 0.2 to 9.5 mg/kg. Low concentrations of cadmium, often less than 0.4 mg/kg are characteristic for almost all of the Istrian Peninsula, while other coastal regions are more significantly burdened with cadmium, with soil concentrations often in excess of 3.5 mg/kg. These higher concentrations are sporadic and usually of geogenic origin, though they can be the result of human activities (e.g. transport and agriculture). Increased concentrations have also been registered in the soils of floodplain sediments of the Drava, Mura and Danube Rivers, as the result of upstream mining and industrial activities.

Cadmium in Croatian soils



Source: CGS

Soil and land

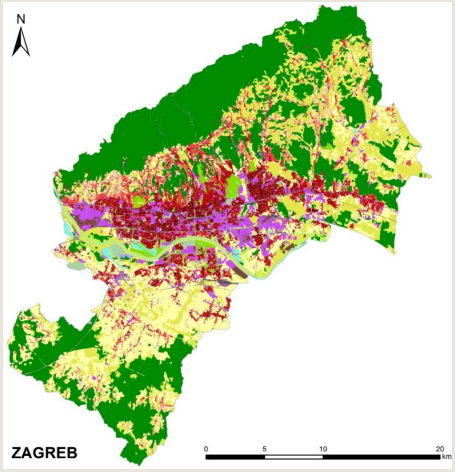
Land cover in urban areas – City of Zagreb

The *Copernicus* programme is a European system for monitoring the Earth using satellite images, and it was developed on the basis of the *CORINE Land Cover* database. The Urban Atlas, as one of the products of this programme, contains detailed data on land cover and land use for larger urban areas in Europe.

Trend and current state

The City of Zagreb covers a surface area of 64,124 ha. The urban cover, including city green areas, is less than one-third the total area of the city (27.5%). Continuous urban fabric with a construction surface higher than 80% account for just 2.2% of the city area, while 12.4% is covered with Discontinuous urban fabric having a construction density of 10 to 80%. Industrial, commercial, public and transport infrastructure cover about 10% of the city area, while green urban areas and Sports and leisure facilities cover 2.4% of the area. The natural cover accounts for more than two-thirds (72.5%) of the areas, since the Medvednica Nature Park lies within the city limits. The natural cover is represented in almost equal proportions of agricultural and semi-natural areas (35.4%) and forests, natural and semi-natural habitats (36.1%).

Land cover of the City of Zagreb



Source: MEE, EEA Copernicus

Note: legend is in the list of abbreviations of this publication.

Biodiversity

Habitat fragmentation in Croatia

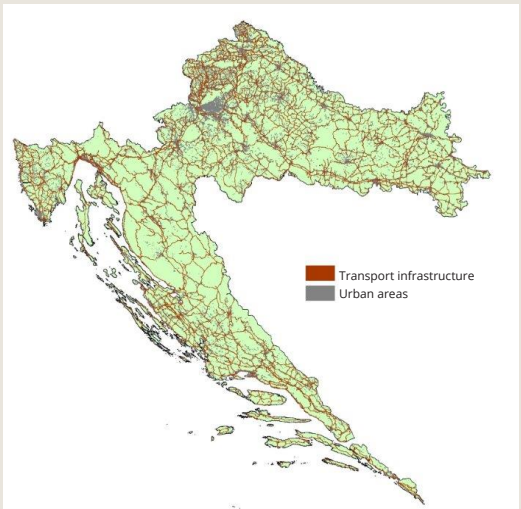
Habitat fragmentation is caused primarily by the construction of transport infrastructure, and also by the construction of settlements, industrial zones and areas of intensive agriculture. Cutting off and limiting the living area for a large number of wild taxa results in population isolation, the reduction of living area, and restrictions to the mobility of individuals. In order to reduce the harmful influence of fragmentation, the construction of green bridges and channels and small passages under roads is recommended.

Trend and current state

The infrastructure fragmentation indicator[10] is used to display habitat fragmentation, showing areas of greater than 100 km^2 that are not intersected by motorways, state roads, county roads and urban areas larger than 1 km^2. The area of the separated, unfragmented areas in Croatia is 33,137.6 km^2, which is 58% of the national territory. While the average surface area of individual unfragmented areas is 233.36 km^2, the largest unfragmented area covers an area of 703.31 km^2 and is situated at the border between Lika-Senj and Zadar Counties, largely encompassing Velebit Nature Park. According to the map of terrestrial non-forested habitats of the Republic of Croatia[11] from 2016, just 4% (2,139.8 km^2) of the total land area of Croatia is covered by lands categorised as Constructed and Industrial habitats.

10 Weber, H. & Illmann, J. (Ed.): Nature Data 2008, Federal Agency for Nature Conservation (BfN), Bonn, Germany. 2008.
11 http://www.haop.hr/hr/baze-i-portali/karta-kopnenih-nesumskih-stanista-republike-hrvatske-2016

Habitat fragmentation in Croatia



Source: MEE

Biodiversity

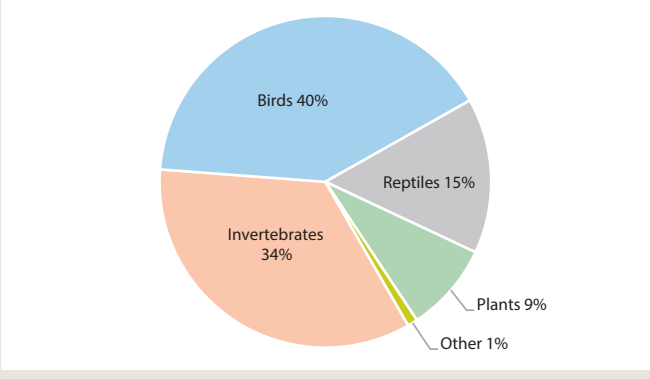
Illegal trade in wild taxa

Today, international trade in wild taxa is one of the main causes of threat for those taxa. Following the uncontrolled and excessive collection and taking of plants and animals from nature, their natural abundance has become dramatically reduced in recent decades.

Trend and current state

In the period from 2013 to 2018, the Nature Protection Inspection Service, Customs Administration and Police performed 245 procedures concerning the illegal trade in wild taxa, which resulted in the seizure of over 6,100 specimens of live plants and animals, dead individuals or their parts or derivatives. Most of these seizures involved birds, primarily songbirds such as goldfinches, bullfinches, greenfinches. The next most common group are the invertebrates, above all the bivalves, followed by reptiles, particularly turtles. Procedures involving strictly protected native species were primarily concerning songbirds. During the observed period, the staff of the Nature Protection Inspection Service prevented the illegal trade of over 3,000 individuals of strictly protected native bird species, predominantly songbirds.

The ratio of seized specimens of CITES[12] species and strictly protected native species by group, from 2013 to 2018



Source: MEE/EUTWIX[13]

12 Convention on International Trade in Endangered Species of Wild Fauna and Flora
13 https://www.eu-twix.org

Forestry

Forests by use

Forests and forest lands in Croatia have multiple functions. Categorising them into one of the legally defined use categories emphasizes the dominant function of the forest, which in turn defines the manner of planning, management and use, in accordance with sustainable management principles.

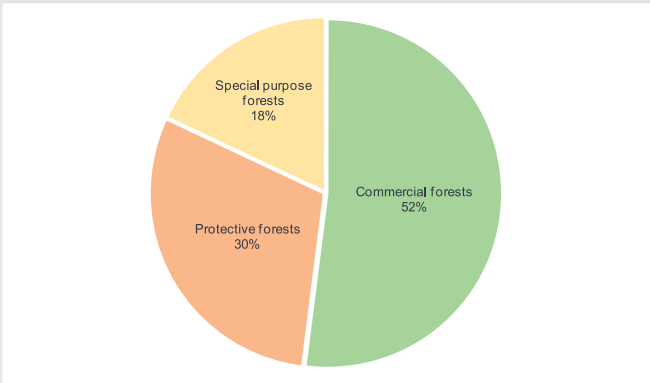
Trend and current state

According to the Forests Act,[14] forests are categorised according to their intended use into commercial, protective and special purpose forests. Commercial forests are primarily used for the production of forest products, protective forests are primarily intended to protect the soil, water, settlements, structures or other assets, while special purpose forests are registered as forest seed areas, protected forests, urban forests, scientific research forests, national protection forests and forests for use pursuant to special rules.

According to the data of the Forestry Management Plan for the period 2016 to 2025, commercial forests cover 1,425,809.46 ha, or 52% of the total area of forests and forest lands. Protective forests cover an area of 832,095.82 ha (30%), and special purpose forests cover an area of 501,133.77 ha (18%). In comparison to 2006, the surface area of commercial forests was reduced by 990,297.71 ha, following changes to the legislation, as these forests were reclassified as protective forests and special purpose forests. In relation to the total forested area, 69% of commercial, 78% of protective and 93% of special purpose forests are under state ownership.

14 Forests Act (OG 68/18, 115/18)

Forests in Croatia, by use



Source: Hrvatske šume

Agriculture

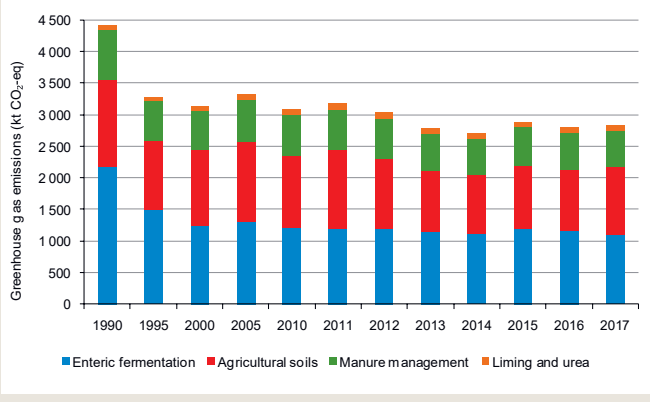
Greenhouse gas emissions from agriculture

Climate change that appears in the form of extreme climate occurrences (drought, flooding) has a significant impact on agricultural production. On the other hand, certain agricultural activities are a significant source of emissions of the greenhouse gases methane (CH_4), nitrous oxide (N_2O) and carbon dioxide (CO_2) into the atmosphere, making the agricultural sector a contributor to climate change.

Trend and current state

For the purposes of National Inventory Report on Greenhouse Gases,[15] sources of emissions from the agricultural sector are monitored: enteric fermentation (CH_4), manure management (CH_4, N_2O), agricultural soil (N_2O) and liming and urea (CO_2). In comparison to the baseline year 1990, the emissions of greenhouse gases from agriculture are declining, and at the end of 2017, emissions were reduced by 35.3%. The reason for this declining trend is the reduction in the number of livestock and crop production, and decrease in mineral fertilizer consumption. The total emissions of greenhouse gases from agriculture in 2017 totalled 2,844.76 kt $CO_{2\text{-eq}}$, which is 14% of the total national greenhouse gas emissions.

Greenhouse gas emissions from agriculture



Source: MEE

15 National Inventory Report, NIR according to the UNFCCC ; http://www.haop.hr/hr/tematska-podrucja/zrak-klima-tlo/klimatske-promjene/izvjesca

Agriculture

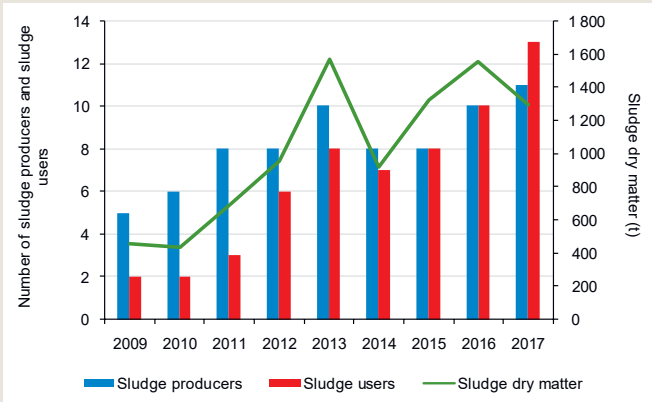
Use of sludge from wastewater treatment plants in agriculture

Only processed sludge containing heavy metals and organic matter in quantities that do not exceed the permitted values prescribed in the Ordinance,[16] and sludge that has been stabilised to ensure that all pathogenic organisms have been destroyed may be used in agricultural production and as a soil enhancer in green areas. Sludge use may not pollute the soil, surface or ground waters.

Trend and current state

In the period from 2009 to 2011, only sludge from biologically treated wastewaters from the food industry were used in agriculture, while since 2012, sludge from municipal wastewater treatment plants has also been permitted for use. In 2014, a reduction in the amount of sludge used in agriculture was recorded, as a consequence of the temporary storage on site at the municipal wastewater treatment plant, or their delivery to landfill. An increase in the amount of sludge use was seen in 2015 and 2016, while levels used in 2017 again declined to 1,290 t of dry matter used in agriculture and on green surfaces. The numbers of producers and users of sludge are increasing, with 11 producers and 13 users registered in 2017.

The use of sludge from wastewater treatment plants in agriculture and as a soil enhancer on green surfaces



Source: MEE

16 Ordinance on the management of sludge from wastewater treatment plants when sludge is used in agriculture (OG 38/08)

Waste management

Food waste

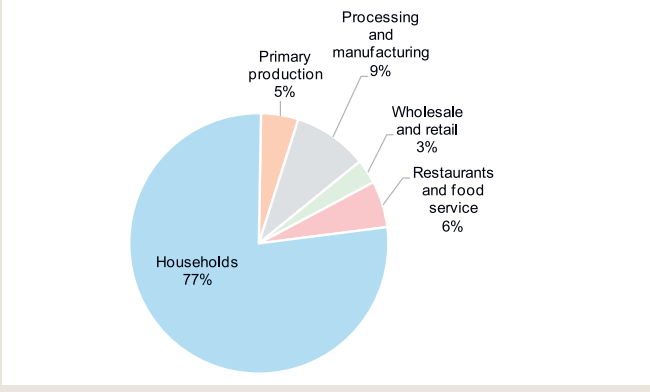
The use of natural resources for food production is seen in the reduced quality of soil and biodiversity, emissions of pollutants into the air and water, and emissions of greenhouse gases. A large share of the produced food ends up in waste, making this a socioeconomic challenge as well. The United Nations have set a target to reduce food waste per capita by half at the retail and the consumer level by 2030, with reduction of food losses in the entire production and supply chain. The EU-28 Members support the fulfilment of this target.[17]

Trend and current state

According to estimates for 2017, 388,611 t of food waste was generated in Croatia, or 97 kg per capita (EU-28 average is 172 kg per capita). It was also assessed that at the annual level, 239,766 t of food waste could be prevented. The largest quantities (77%) totalling 75 kg per capita per year (EU-28 average 92 kg per capita) are generated in the household, while 9% is generated in the processing and manufacturing industry, 6% in restaurants and food service activities, 3% in wholesale and retail trade, and the remaining 5% at farms, fish farms and in fisheries. In 2017, 78% of food waste was taken to landfill, 16% was used primarily for composting and anaerobic digestion procedures, while 6% of food waste was processed for use or disposal. The avoided quantity of food waste in the processing industry was 127,631 t, which refers to by-products from the processing of milk, beer and potatoes, which were reused. Where food surpluses cannot be avoided, food donation activities are recommended.

17 Closing the circle — the EU Action Plan for a circular economy

Share of food waste by origin of generation in 2017



Source: MEE

Waste management

Separate collection of municipal waste organised by public service providers

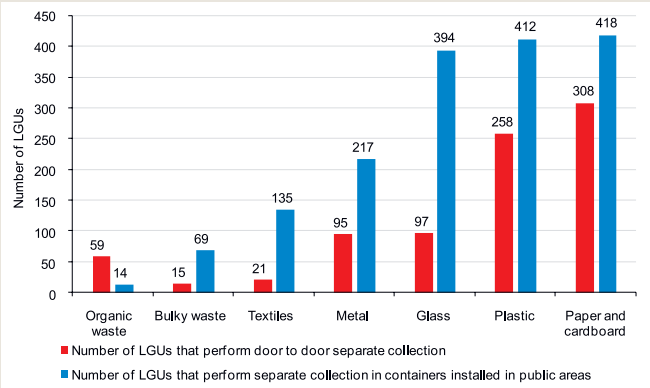
REPUBLIC of CROATIA
Ministry of Environment and Energy

Public service providers that collect mixed and biodegradable municipal waste (municipal companies) execute the activities of separate collection of individual fractions of household waste, such as paper and cardboard, glass, plastic, metal and organic waste, and bulky waste. The objective is to use the valuable properties of waste.

Trend and current state

In the first reporting year (2017), a total of 197 municipal companies submitted their work report for 544 (98%) of the total 556 local government units (LGU). Separate collection of paper and cardboard is performed in 483 LGUs, plastic in 469, metal in 277, textiles in 150, organic waste in 69 and bulky waste in 83 LGUs. There are 52 LGUs that do not have an organised system of waste collection at the service user (i.e. door to door collection) or on public areas. Some LGUs have both systems of waste collection organised, with 251 LGUs distributing bins for separate collection door to door, and 450 LGUs installing containers in public areas for separated collection.

Number of LGUs performing separate collection of individual types of waste in 2017



Source: MEE

Waste management

Recycling packaging waste

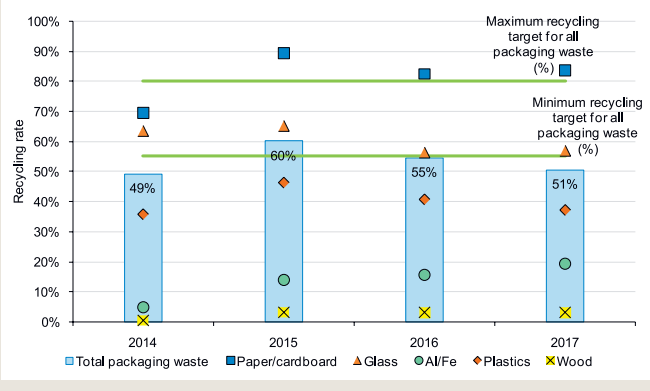
REPUBLIC of CROATIA
Ministry of Environment and Energy

Packaging waste is one of the key fractions that determines the volume and composition of municipal waste. The level of economic development of the country, the national waste management policies and resident habits all significantly influence the quantity and composition of packaging waste. Most packaging can be recycled, though proper separation and categorisation is necessary.

Trend and current state

According to the data for 2017, 278,068 t of packaging waste were placed on the Croatian market, while 140,885 t of packaging waste were recycled that same year. The recycling rate for all packaging waste in Croatia in 2017 was 51%, while according to the currently available data for 2016, the average rate for EU-28 was 67%. In Croatia in 2017, 84% of paper/ cardboard packaging was recycled, 57% glass packaging, 37% plastic packaging, and just 19% metal and 3% wooden packaging were recycled, showing significant room for improvement. Namely, packaging materials are considered recyclable if they can be used for the production of new packaging or products, and therefore it is exceptionally important to increase the use of products made from recycled materials and to raise public awareness through education about the value of separating packaging waste by material.

Rate of recycling packaging waste, in total and by materials



Source: EEEPF/MEE

Energy

Structure of total energy consumption by sector

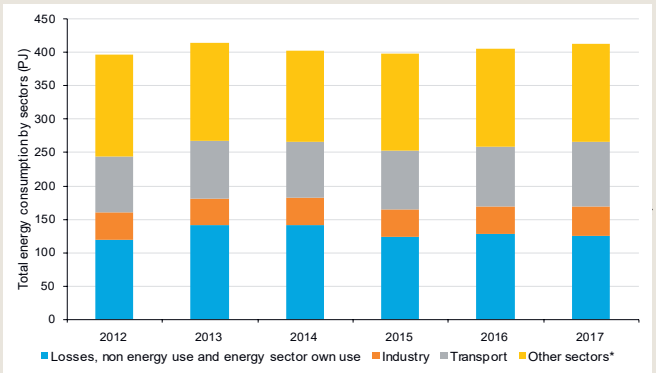
The total energy consumption includes the sectors: Transformation losses and Transport and distribution losses (Losses), Plant consumption, Non-energy consumption, and the sector Indirect consumption, which encompasses Industry, Transport and General Consumption.[18] The total per capita energy consumption in Croatia in 2017 was 2,397 kg of oil equivalents, which is 30.1% less than the EU-28 average.

Trend and current state

In 2017, Losses, Non-energy and Plant consumption accounted for 30% (121.31 PJ) of the total energy consumption, while the sector Indirect energy consumption accounted for 70% (289.54 PJ). The highest energy consumption was recorded in General consumption sector, particularly in the subsector Households (100.15 PJ). Of other subsectors within the Indirect consumption sector, Transport accounted for 23.7% of energy spent (98.04 PJ), and Industry for 10.7% (44.48 PJ) of the total consumed energy. In the period 2013 to 2017, direct energy consumption increased by 5%, and the highest consumption was recorded in the sectors General consumption (36% on average), Transport (21% on average) and Industry (10% on average). In examining the trends of total energy consumption during the same time period, an increase in energy use is evident in the sectors Industry, Transport and subsectors Service sector and Agriculture, while in the subsector Households and Construction, energy consumption declined. This may be associated with measures to improve energy efficacy that have been intensively implemented in recent years.

18 General consumption is the sum of energy consumption in the subsectors Households, Service sector and Construction.

Structure of total energy consumption by sectors



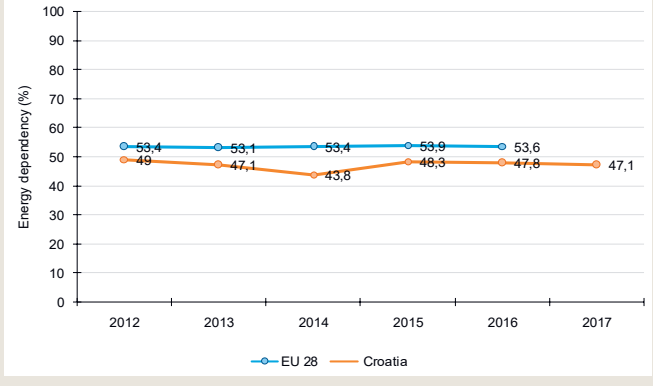
Source: EIHP

energy that a country needs to import from other countries in order to meet its energy needs. When high, energy dependence exposes the economy to fluctuating prices on the global market and risks of supply shortages that arise, for example, due to geopolitical conflicts. In order to ensure greater energy independence, it is necessary to implement diversification of energy sources[19] with an emphasis on increasing energy from renewable sources.

Trend and current state

The average share of Croatia's energy dependence is about 50%. While energy import dependency in the EU-28 did not significantly fluctuate during the observed period, it varied greatly in Croatia. The reason for this is the already diversified energy sources in most EU-28 countries, while Croatia is still largely dependent upon hydropower. The quantity of energy production from hydropower depends on the hydrological conditions, and the quantity of precipitation. For example, the share of hydropower generation in total energy generation in 2014 was 36.5%, while in 2017 it was around 28%. In order to avoid not only energy dependency in the future, but also its variable nature, Croatia is currently in the process of diversifying its energy sources, particularly through the introduction of new renewable energy sources, especially wind power plants.[20]

Croatian and EU-28[21] energy import dependency



Source: Eurostat, EIHP

19 Diversification of energy sources – the use of different types of energy sources

20 OIEKPP Register; http://oie.mingorp.hr/default.aspx?id=24

21 Data for EU-28 (source EUROSTAT) are not currently available for 2017

Industry

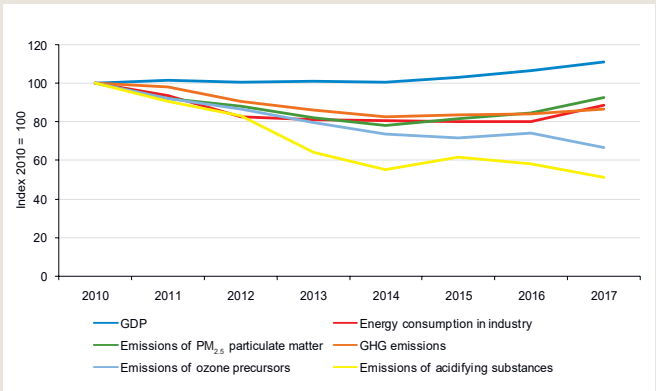
Ecological efficiency in industry

Industrial production can be ecologically efficient. The requirements are that the supply of goods and services meet the needs of the population and contribute to the quality of life, while simultaneously ensuring the rational use of natural resources and the reduction of negative impacts on the environment.

Trend and current state

In the period from 2010 to 2017, the emission of pollutants from the industrial sector[22] was reduced. In comparison to 2010, the greatest reductions were seen in the emissions of acidifying compounds[23] (by 49%) and the emission of ozone precursors (by 33%). Emissions of particles ($PM_{2.5}$) and emissions of greenhouse gases did not change significantly, with an increase recorded in 2017 over 2016 values. In the observed period, economic growth – which recorded an 11% increase in GDP – was partially separated from the emissions of pollutants into the air. Namely, a separation is visible in the ties between GDP and ozone precursor emissions and acidifying compounds, but not from the emissions of greenhouse gases and $PM_{2.5}$. Therefore, in the activity Combustion of fuels in energy plants, it is necessary to launch serious initiatives and measures to achieve sustainable industrial production and consumption.

Index of ecological efficiency in industry



Source: CBS, EIHP, MEE

22 Includes the activities: 1A energy – emissions from fuel combustion (without activity 1A3 fuel combustion in transport and 1A4 fuel combustion in the general consumption sector), 1B energy – fugitive emissions from fuel, and 2 production processes and use of products

23 Emission of acidifying compounds expressed as the acid equivalent index (Aeq), calculated using the weighted coefficients: SO_2 0.0313; NO_x 0.0217 and NH_3 0.0588

Industry

Industrial accidents

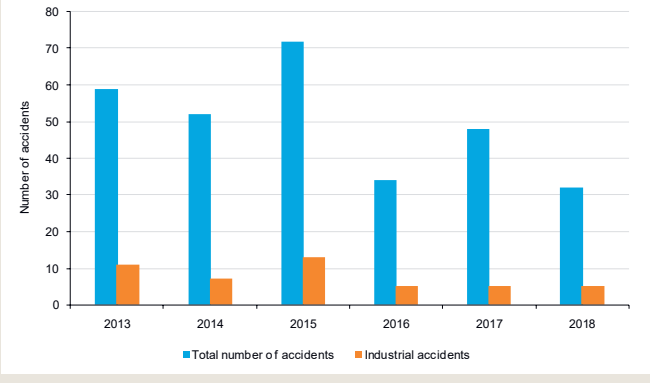
Industrial accidents are events in industry that are not under control, and may represent a threat to human health and safety, may cause damage to material and cultural resources, and may have a negative impact on the environment. The industrial sector needs to create the preconditions for reducing the possibility of such occurrences, and to mitigate their consequence, which has been stipulated in a series of regulations.[24]

Trend and current state

In the period from 2013 to 2018, the number of accidents was reduced. The share of industrial accidents are amounted to an annual average of 15% of all reported accidents. In 2018, of the 32 reported accidents, five were reported in the Industry sector. In observing the accidents by cause, the most frequent causes are human error and mechanical malfunction, at an average of 70 – 85%, while disturbances in the technological process, natural disasters and "other" sources are less frequent (25–30%). Further adoption of the concept of Best Available Techniques (BAT),[25] the safety management system and accident prevention policy, as well as implementation of supervision has resulted in a reduction in the number of industrial accidents.

The project CRO SEVESO Twinning RH[26] is focused on this aim.

Number of total and industrial accidents



Source: MEE/EPI

24 https://www.mzoip.hr/hr/inspekcija/propisi-i-medunarodni-ugovori.html

25 BAT – Best Available Technique implies all techniques, including technology, planning, construction, maintenance, operation and closure of plants that are most effective in achieving the highest degree of protection for people and the environment.

26 http://www.haop.hr/hr/tematska-podrucja/otpad-i-registri-oneciscavanja/postrojenja-i-registri-oneciscavanja/projekti-8

Chemicals

Production and import of hazardous chemicals in Croatia, by type of threat to health

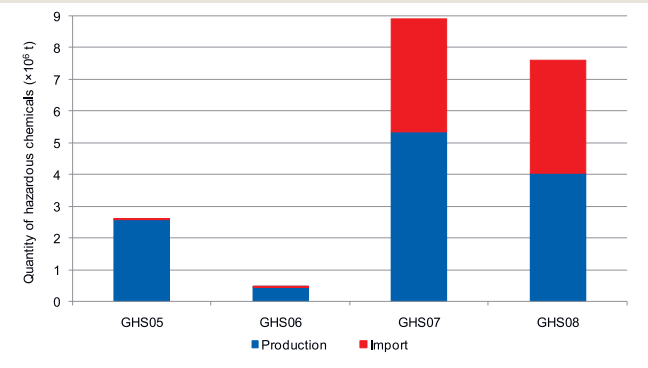
Data on chemicals[27] (compounds and mixtures) and biocidal products that are produced and imported, or brought into the territory of Croatia, and data on the production of plant protection compounds, are delivered to the Croatian Public Health Institute (CPHI) via the Record on chemicals. The data are delivered by natural and legal persons performing the activities of production and import, or bringing chemicals into the national territory, and plant protection products.

Trend and current state

In 2017 (1 June), the transitional period ended for adjustments in marking dangerous chemicals, pursuant to the new labelling system according to the Regulation (EC) No 1272/2008 (CLP Regulation). According to the new labelling system, Croatia produced a total of 7.02 million t of hazardous chemicals in 2017. The most production was in the Primorje-Gorski Kotar, Sisak-Moslavina and Osijek-Baranja Counties, where the petrochemical industry is present. Examining the data on chemicals according to type of health hazard, in the total produced quantity, chemicals with the following hazard codes were dominant: GHS07 (5.34 million t) and GHS08 (4.06 million t), followed by GHS05 (2.61 million t) and GHS06 (0.47 million t). In the same year, 3.65 million t of hazardous chemicals were imported, where again the most dominant category were GHS07 with 3.58 million t and GHS08 with 3.56 million t. Chemicals in classes GHS06 (2.5 million t) and GHS05 (9.7 thousand t) were also imported, though in significantly lower amounts.

27 Pertains to "chemicals defined in Article 3, paragraph 1, points a) and b) of the Chemicals Act (OG 18/13 and 115/18), and chemicals requiring the safety technical sheet pursuant to the REACH Regulation".

Production and imports of hazardous chemicals according to health hazard code in 2017



Source: CIPH

Tourism

Waste generation in tourism

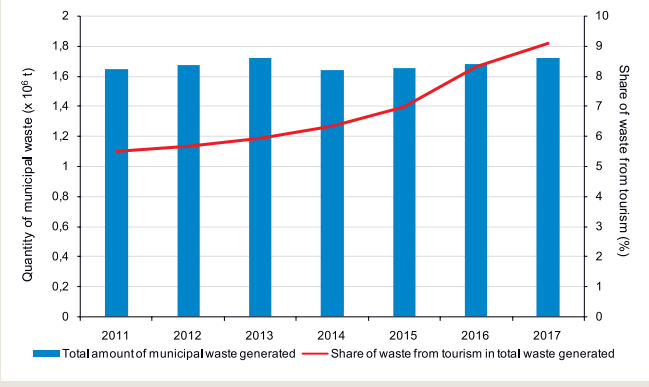
Tourism is one of the key economic branches and a strategic area of development for Croatia. With the positive economic impacts, the development of tourism also results in an increased burden on the environment, which also brings with it increasing quantities of waste generated from tourism. The assessments of waste generation in stationary tourism are based on the methodology for developing sustainable tourism indicators,[28] which consider the total number of tourist nights, with a 20% correction due to the share of the grey economy (unregistered tourists), the size of the population and the total quantities of municipal waste.

Trend and current state

In the period from 2011 to 2017, waste generation in tourism increased by 72.1% as a result of the continuous growth in tourist nights. In the same period, the total quantity of generated municipal waste increased by 4.3%. According to estimates, tourism waste accounted for 9.1% (155,958.04 t) of the total quantity of municipal waste (1,716,440.72 t) generated in 2017, which is a significant share, particularly considering the seasonal character of Croatia's tourism. The Adriatic Croatia accounts for almost 97% of all tourism waste, which is expected given that the majority of all tourism traffic and activities take place in this region. Namely, 96% of all tourism traffic taking place in the Adriatic Croatia, and just 4% in the Continental Croatia.

28 Methodological work on measuring the sustainable development of tourism, Part 2: Manual on sustainable development indicators of tourism, European Commission, 2006

Share and quantity of waste from tourism in total municipal waste



Source: MEE

Transport

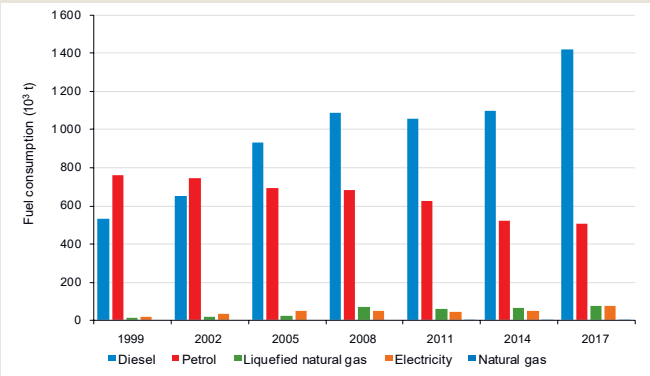
Energy consumption in road transport

The reduction of greenhouse gas emissions and pollutant substances into the air from the transport sector is one of the greatest challenges faced by contemporary society. The main source of emissions in this sector is road transport, as its volume increases significantly each year. Measures such as introducing vehicles with low or zero emissions, and modal transport that incorporates railways into city transport, and stimulating changes in habits in public transport and movement (cycling and walking), mobility sharing solutions (such as car-sharing), and the construction of infrastructure and development of the alternative fuels market in transport,[29] are prerequisites for reducing emissions and energy consumption in road transport.

Trend and current state

Road transport is the dominant energy consumer in the transport sector, accounting for 88.1% of all energy consumption, with no current declining trend. The data indicate that the both the numbers of vehicles and the distance travelled are increasing, while the number of passengers per vehicle is declining. In comparison to 2016, energy consumption in 2017 increased by 7.6%, with an average annual growth rate of 3.1%. Due to the affordable price of diesel fuel, the ratio of diesel to petrol vehicles during this period was 3:1. The share of electrical energy and liquefied natural gas is minor. The contribution of road transport to total greenhouse gas emissions in 1990 was 11.4%, and increased to 24.4% in 2016, which is an increase of 53.4%,[30] primarily due to the increased numbers of vehicles and the increased use of diesel.

Energy consumption in road transport



Source: EIHP

29 Transport Development Strategy of the Republic of Croatia (2017–2030)

30 Croatian greenhouse gas inventory for the period 1990 – 2016 (National Inventory Report - NIR2018)

Transport

Incentives for energy efficiency in transport

Incentives for energy efficiency in transport are directed at reducing harmful emissions into the air, particularly in cities where transport is increasingly intensive. As part of the activities to stimulate cleaner transport, the Energy Efficiency and Environmental Protection Fund (EEEPF) encourages the use of hybrid, plug-in[31] hybrid and electric vehicles, and co-finances the construction of charging stations and eco-driving training, along with other measures to improve energy efficiency in transport.

Trend and current state

In the period from 2013 to 2018, the EEEPF has paid out 103.24 million HRK as incentives for energy efficiency in transport, with 85 million HRK paid out for the co-financing of procurement of electric, hybrid and plug-in hybrid vehicles. As the fundamental requirement for the wider use of energy efficient vehicles, the EEEPF co-financed the construction of charging stations for electric vehicles in 2015 and 2016, in the amount of almost 1 million HRK. Increasing the use of electric, hybrid and plug-in hybrid vehicles reduces the load of the transport sector on the environment, and stimulates energy efficiency. Furthermore, in the period from 2013 to 2015, the EEEPF invested 1.31 million HRK to co-finance eco-driving training, as one of the most efficient measures to stimulate energy efficiency in transport at the European Union level.

Funds invested in stimulating energy efficiency in transport

Co-financing programme (in HRK million)	2013	2014	2015	2016	2017	2018
Co-financing electric, plug-in hybrid and hybrid vehicles	9.7	15.5	34.8	0	0	25
Co-financing the construction of electric charging stations	0	0	0.32	0.61	0	0
Co-financing eco-driving training	0.69	0.54	0.08	0	0	0
Co-financing other measures for energy efficiency in transport	1.25	6.62	8.13	0	0	0

Source: EEEPF

31 Plug-in hybrids use an internal combustion engine with one or more electric motors. Charging the battery requires an external energy source via an electrical outlet. Unlike hybrids, plug-in hybrids draw the majority of the power from the electric motors, which take on the primary role.

Health and safety

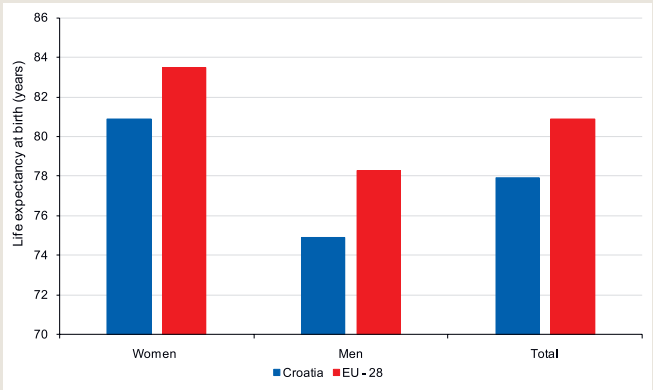
Life expectancy at birth

Data on the life expectancy at birth show the likely age that a person born in a given year will live to, under the assumption that during the lives of those persons, that mortality at age remains the same as in the year of birth. Over the past 50 years, the life expectancy at birth has increased by about 10 years, primarily due to the improvement of socioeconomic and environmental conditions, improved working conditions, and medical progress. In addition to being used as a demographic indicator of the state of health of the population, it is also an indicator of the level of economic development of a country.

Trend and current state

The increasing trend in life expectancy for both sexes suggests that economic growth and technological development are contributing to its increase. The data indicate that, as a rule, women live longer than men. In the EU-28, women live just over 83 years, while this is almost 81 years in Croatia. The average male resident of the EU-28 lives about 78 years, which is three years longer than men in Croatia. In Croatia, women live an average of 6.7 years longer than men, while in the EU-28, this difference is 6 years. In the EU-28, the shortest life expectancy for women is in Bulgaria (78 years) while the longest is in Spain (86.2 years). For men, the shortest life expectancy is in Latvia (69.1 years), while the highest is in Cypress (80.9 years).[32]

Life expectancy in Croatia and the EU-28 in 2017



Source: Eurostat

32 https://www.dzs.hr/Hrv/important/Interesting/articles/Tko%20sam%20ja%20u%20EU.pdf

General environmental issues

Environmental taxes

The share of the value of environmental taxes in total tax revenues[33] is examined to monitor the progress towards the "greening" of the economy. In 2011, the European Commission set the target[34] that by 2020, the average share of environmental taxes in tax revenues of EU-28 Member States will be increased to over 10%, to improve resource efficiency.

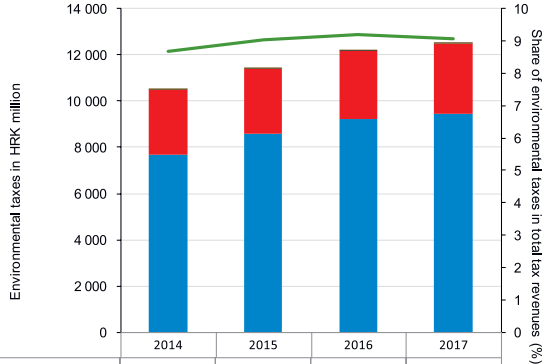
Trend and current state

In the period from 2014 to 2017, the total amount of environmental taxes in Croatia increased by 19%. The greatest increase was recorded in the energy taxes (23.7%). Transport tax revenues increased by 6.8%, while pollution tax revenues were reduced by 32.8%. In 2017, the share of environmental taxes in total tax revenues in Croatia totalled 9.1%, while the EU-28 average accounted about 6%. Latvia and Slovenia are the only Member States to currently have a share of environmental taxes over 10%. It should be stressed that in addition to collecting environmental taxes, these funds are further synergistically connected with other non-financial environmental policy measures, and monitor investments and efforts to direct the economy towards increasing resource efficiency.

33 Total tax revenues include social contributions

34 Analysis associated with the Roadmap to a Resource Efficient Europe, EC SEC(2011) 1067

Environmental taxes in the total tax revenues of Croatia



	2014	2015	2016	2017
Pollution taxes	3.17	2.21	6.56	2.13
Resource taxes	52.69	50.51	51.65	52.88
Transport taxes	2,817.37	2,816.85	2,950.41	3,007.61
Energy taxes	7,661.91	8,573.45	9,238.37	9,474.73
Share of environmental taxes in total tax revenues (%)	8.66	9.04	9.21	9.08

Source: Eurostat

Sustainable consumption and production

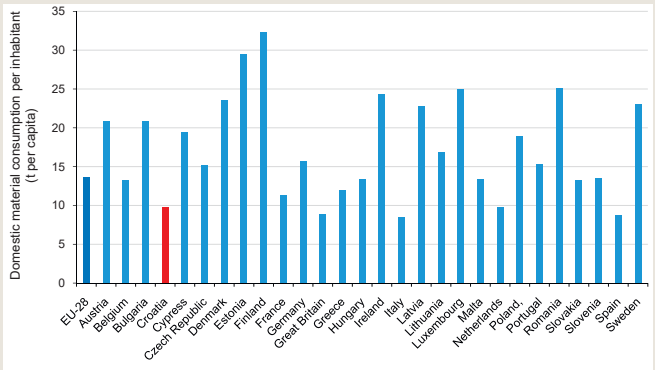
Material footprint

One of the environmental policy main objectives is the efficient use of resources, i.e. decoupling the consumption of materials from economic growth. The material footprint shows the burden on natural resources caused by exploitation, i.e. the extraction of materials.[35] Domestic material consumption[36] provides insight into the economy-wide material flow accounts at the level of the Member State, i.e. it measures the total quantity of materials that are directly used in the national economy.

Trend and current state

According to the Eurostat estimates for 2017, the domestic material consumption in Croatia totalled 9.7 t per capita, while the EU-28 average was 13.6 t per capita. The highest domestic material consumption per capita is in Finland (32.3 t), followed by Romania (25.1 t per capita) and Luxembourg (25 t per capita). The Member States with the lowest per capita domestic material consumption are Italy (8.5 t), Spain (8.7 t) and Great Britain (8.9 t). It is important to note that the domestic material consumption does not include hidden flows, i.e. does not provide a complete overview of the material footprint, since during import and export the weight of the finished product is recorded, instead of the actual weight of materials exploited from the environment for the production of that product.

Material footprint in EU-28 Member States in 2017



Source: Eurostat

35 Materials: biomass, metal ores, non-metallic minerals, fossil energy
36 Domestic material consumption = domestic extraction + import - export

Circular economy

Circular material use rate

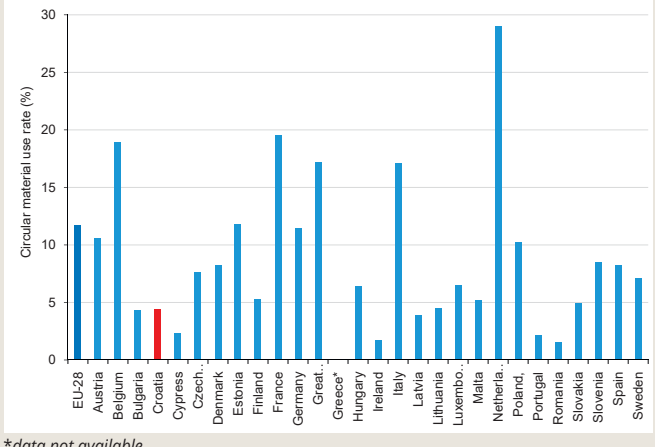
REPUBLIC of CROATIA
Ministry of Environment
and Energy

The circular material use rate[37] is one of the indicators of a circular economy that monitors progress in increasing the use of secondary raw materials. Increasing the quantity of recovered materials that are fed back into the economy reduces the generation of waste and exploitation of primary raw materials, i.e. the domestic extraction of materials, which is the main objective of the circular economy. This rate also shows the contribution of secondary raw materials in the overall material use.

Trend and current state

According to the available Eurostat data for 2016, the circular material use rate in Croatia was 4.4%, while the EU-28 average was 11.7%. The highest rate was in Netherlands, with almost one-third of secondary raw materials in the total material consumption (29%). The higher value of circular material use rate also means a higher share of recycled materials in the overall material consumption. In other words, secondary materials effectively substitute primary raw materials, which in turn reduces the domestic extraction of materials and the burden that their exploitation can have on the environment.

The circular material use rate in EU-28 countries in 2016



Source: Eurostat

**data not available*

37 The circular use of materials implies the use of usable waste as a secondary raw material that can be used as an input material for further production.

Public relations

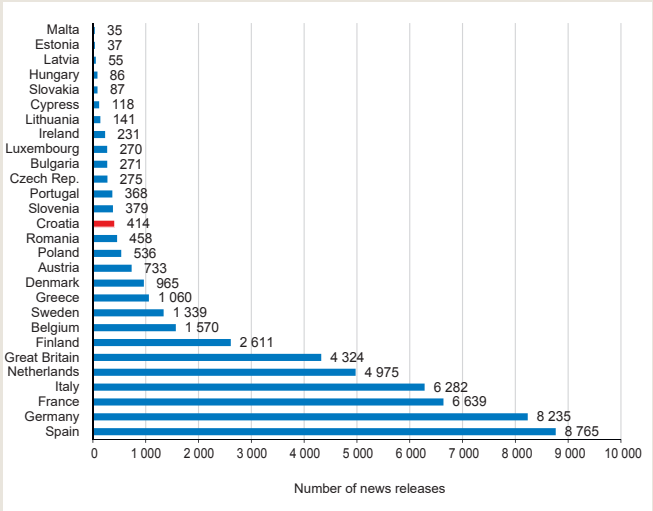
Coverage of the circular economy topic in electronic mass media

Mass electronic media today (radio, television and websites) are the most important channels for the publication of news, including current affairs and activities concerning the improvement of environmental quality. Therefore, the number of news releases in these media can be considered one of the indicators of development of a given topic or area. Since the progress of the circular economy primarily depends on the research community and on the dynamics of changing current behaviours of both producers and consumers, monitoring the trends of coverage of these topics in the media is of the utmost importance.

Trend and current state

During 2016, the popularity of the topic of the circular economy was monitored in all EU-28 Member States. The data show that the highest number of news releases (over 6,000 each) were in Spain, Germany, France and Italy. This comes as no surprise, as these are developed countries with large populations. Among the smaller countries, The Netherlands had nearly 5,000 news releases and Belgium had about 1,000. With 414 news releases on this topic, Croatia was in 15th place. The fewest news releases on the topic of the circular economy were in Malta, Estonia, Latvia, Hungary and Slovakia (between 35 and 87).

Coverage of the circular economy topic in the EU-28 countries in 2016



Source: EIO

Abbreviations

BAT	Best Available Techniques
CBS	Croatian Bureau of Statistics
Cd	cadmium
CGS	Croatian Geological Survey
CH_4	methane
CIPH	Croatian Institute of Public Health
CO	carbon monoxide
CO_2	carbon dioxide
CORINE	COoRdination of INformation on the Environment
DHMZ	Croatian Meteorological and Hydrological Service
EEA	European Environment Agency
EEEPF	Energy Efficiency and Environmental Protection Fund
EIHP	Energy Institute Hrvoje Požar
EIO	Eco-Innovation Observatory
EPI	Environmental Protection Inspection
EU	European Union
Eurostat	Statistical Office of the European Union
GDP	gross domestic product
GHG	Greenhouse gases
GHS05	code for chemicals that are corrosive to skin/metals and cause grave eye injuries
GHS06	code for chemicals that cause acute toxicity, categories 1-3
GHS07	code for chemicals that cause acute toxicity, category 4, irritating chemicals, skin sensitisation, toxicity to target organs – single exposure, category 3, threat to the ozone layer
GHS08	code for chemicals that cause respiratory sensitisation, mutagenicity, carcinogenicity, reproductive toxicity, toxicity for target organs – single exposure, categories 1 and 2, specific target organ toxicity following repeated exposure, categories 1 and 2, aspiration hazard
GWB	groundwater bodies
HCB	hexachlorobenzene
LGU	local government units
MEE	Ministry of Environment and Energy
NH_3	ammoniac
NMVOC	non-methane volatile organic compounds
N_2O	nitrous oxide
NO_x	nitrogen oxides
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PJ	petajoule (10^{15} J)

Abbreviations

$PM_{2,5}$	particulate matter with an aerodynamic diameter of less than 2.5 μm
POPs	persistent organic pollutants
SO_2	sulphur dioxide
TV	target values
UN	United Nations

Legend for the figure "Land cover of the City of Zagreb"

Glossary

- **Accidents** – a type of occurrence caused by uncontrolled activity or effects and may result in a threat to human life and health and larger events can caused damages to the environment.
- **Acid equivalent index (Aeq)** – an index that calculates the total quantity of emissions of acidifying substances into the air: sulphuric dioxide (SO_2), nitrogen oxides (NO_x) and ammoniac (NH_3).
- **Alternative fuels** – fuels or energy sources that serve, at least in part, as a substitute for fossil fuel sources in the energy supply to transport, and which have the potential to contribute to the decarbonisation of the transport system and improve the environmental efficacy of the transport sector, which includes: electrical energy, hydrogen, bio fuels (liquid or gaseous bio fuels intended for transport and produced from biomass), synthetic and paraffin fuels, natural gas, including biogas, in gaseous (compressed natural gas – CNG) and liquefied form (liquefied natural gas – LNG), and liquefied petroleum gas (LPG).
- **Anaerobic digestion** – technological process of waste management that uses microorganisms in anaerobic conditions in a biogas reactor to process and stabilise biologically degradable waste, with the generation of biogas.
- **Biodegradable municipal waste** – waste generated in the household and waste which in its nature and composition is similar to household waste, with the exception of production waste and waste from agriculture and forestry, and which in its composition contains biologically degradable waste.
- **Bio waste** – biologically degradable waste from gardens and parks, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants.
- **Circular economy** – an economic model that ensures the sustainable management of natural resources and a longer lifespan of materials and products, while simultaneously reducing waste, not only in the production process, but also during the entire life cycle of a product. In circular economy systems, the product added value is retained for as long as possible and generates no waste, which also stimulates global competitiveness, sustainable economic growth and new job creation.
- **Cleaner transport** – implies the use of environmentally friendly vehicles (electric, hybrid and plug-in hybrid vehicles).

- **Composting** – technological process of waste management that uses microorganisms in aerobic conditions to process and stabilise biologically degradable waste with the generation of heat. Biologically degradable waste that is not managed (e.g. rotting of biological degradable waste) is not considered composting.
- ***Corine Land Cover database*** – digital database on the state and changes of land cover and land use in the Republic of Croatia for the period 1980–2018. The CLC Croatia database is consistent and homogenised with land cover data for the entire European Union. It was developed according to the CORINE (*COoRdination of INformation* on the Environment) programme adopted by the European Union, and at the EU level, has been assessed as a fundamental and reference data set for spatial and territorial analyses.
- **Final energy consumption** – represents the consumption of energy in industry, transport and other sectors (households, services, agriculture, and construction).
- **Greenhouse gases** – gaseous components of the atmosphere of natural and anthropogenic origin that absorb and reemit infrared radiation. These are carbon dioxide, methane, nitrous dioxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride.
- **Recovery of waste** – any operation the principal result of which is waste serving a useful purpose by replacing other materials, which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Appendix II of the Sustainable Waste Management Act contains a list of recovery procedures that do not exclude other possible recovery procedures.
- **Secondary raw materials** – useful waste that can be used as an input material for further production.
- **Treated sludge** – sludge that has undergone biological, chemical or heat treatment, long-term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use.
- **Urban land cover** – land cover that is dominated by human impacts, and includes all artificial structures and the accompanying uncovered surfaces and surfaces covered by vegetation (e.g. parks). Does not include lands used in agriculture.
- **Use of sludge** – the spreading of sludge on the soil or any other application of sludge on and in the soil

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