The Eco-Innovation Observatory functions as a platform for the structured collection and analysis of an extensive range of eco-innovation and circular economy information, gathered from across the European Union and key economic regions around the globe, providing a much-needed integrated information source on eco-innovation for companies and innovation service providers, as well as providing a solid decision-making basis for policy development.

The Observatory approaches eco-innovation as a persuasive phenomenon present in all economic sectors and therefore relevant for all types of innovation, defining eco-innovation as:

“Eco-innovation is any innovation that reduces the use of natural resources and decreases the release of harmful substances across the whole life-cycle”.

To find out more, visit [www.eco-innovation.eu](http://www.eco-innovation.eu) and [ec.europa.eu/environment/ecoap](http://ec.europa.eu/environment/ecoap)

Any views or opinions expressed in this report are solely those of the authors and do not necessarily reflect the position of the European Commission.
Eco-Innovation Observatory

Country Profile 2016-2017: Croatia

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A note to Readers
Any views or opinions expressed in this report are solely those of the authors and do not necessarily reflect the position of the European Union.

A number of companies are presented as illustrative examples of eco-innovation in this report. The EIO does not endorse these companies.

The report is based on an updated methodology for calculating the Eco-Innovation Index, which has also been applied retroactively to all previous years, hence the outcome in the Eco-Innovation Scoreboard (Eco-IS) for 2017 presented in this report can be compared with the analysis in the previous reports to a limited extent.

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This brief is available for download from https://ec.europa.eu/environment/ecoap/country_profiles_en
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**ANNEX:** Policy measures addressing circular economy and eco-innovations in Croatia 21
Summary

Croatia still has a long way to go in the transition from a linear to a circular economy, but adjustments of Croatia’s policies with EU regulations are in progress and significant improvements have been made in the past two years. Policies such as the Waste Management Plan with a focus on waste prevention, green public procurement, along with activities aimed at the implementation of national strategies regarding innovation and smart specialisation give a realistic hope for Croatia’s circular economy future. Moreover, since 2015, a growing number of projects and products based on eco-innovation, energy efficiency and recycling have been implemented and introduced to the market.

In 2017, the composite Eco-Innovation index for Croatia was 72% of the EU average. This places Croatia in the middle of the 16 EU member states that fall below the EU average, finishing 8th from the bottom in terms of eco-innovation. Compared to 2015, Croatia remains within the same Member State (MS) group segment i.e. MS countries catching up on eco-innovation practices compared to the rest of Europe, however, it ranks 4 places higher than two years before. Nevertheless, the country’s eco-innovation inputs are 85% below EU average and as such, is the worst performing MS for 5 parameters of the Eco-Innovation index. Croatia’s highest scores are seen in socio-economic outcomes and eco-innovation activities, which are 5 and 7 percent below the EU average. There is certainly improvement compared to 2015, however the indicators show that more effort should be made in R&D funding, as well as total value of early stage green investments.

Improvement can be seen in the link between scientific institutions and the business sector, nonetheless, this uptrend needs to continue in order to catch up with Europe’s standard benchmark. Croatia’s sources of funding are still mostly coming from EU investment funds, but positive growth has occurred in terms of capital provided by Croatian institutions such as the Environmental Protection and Energy Efficiency Fund. This has helped increase the number of new eco-innovative products that have been introduced into the market in the past years, as well as launched actions to promote eco-innovations, transition to a circular economy, waste prevention, and reuse of waste materials.

In terms of policy landscape, the Croatian government and national and local authorities made efforts to create and publish strategies, plans, and guidelines on waste management, waste prevention, innovation support and promotion, environmental protection, smart specialisation, re-use of materials, and green public procurement.
Introduction

Striving for eco-innovation development and a transition to a circular economy remain important challenges for the national and local governments in Croatia, especially within the context of decisive European Union directives on waste management. Namely, the European Commission’s Circular Economy Package, which includes a strong focus on improving recycling waste systems by 2030. It is therefore crucial to stress the importance of finding solutions for Croatia’s waste management issues and to find new methods that would support its transition to a circular economy. This is especially important today as Croatia is finally starting to gain noticeable economic recovery and growth, which is reflected by a record growth of Croatian industry production.

With regards to the waste management challenge, in 2016 Croatia was ranked third from the bottom among EU Member States with a 77% rate of municipal waste (sent to) disposal, which indicates that the collection and recycling system is inadequate. The Croatian waste management system currently still relies on landfiling with an inadequate rate of waste collection separation and an insufficient recycling infrastructure. In 2016, the communal waste recovery rate in Croatia was 21%, while according to the EU directive this should be at least 50% by 2020. The Croatian government introduced its Waste Management Plan for the period 2017-2022, which calls for intensifying the separation of household waste and the construction of more sorting and recycling centres close to the waste generating locations (e.g. local communities). Furthermore, for a long time, one of the continuous issues was a lack of information provided to the citizens regarding waste management. This is slowly changing, however significant additional efforts need to be made regarding communication and promotion of the proper method of separating waste among Croatian citizens.

Regarding the renewable energy sector, Croatia has made significant improvements. The EU accession process has been a main driver of policy reform and significantly influenced the definition and establishment of policy goals and targets. Croatia incentivised green energy, and improved the proportion of renewables in the country’s overall energy mix, but at the price of slightly higher electricity bills for households. As a result, Croatia is 8th best performer in terms of EU renewable energy share, and has potential to further increase contribution of the amount of energy produced from solar and wind energy due to its favourable geographical preconditions.

Croatia is known for its rich biodiversity and has 19 national and nature parks. Approximately 47% of the land and 39% of sea are protected areas. Tourism therefore, is an important source of income; however, it also poses challenges to natural protection mainly because of the construction and pressure on local infrastructure particularly during the summer months. Cruising and nautical tourism are the fastest-growing types of tourism and require efforts for adequate management of the marine environment.

When analysing eco-innovations and its transition path towards a circular economy, Croatia significantly lags behind the rest of the EU.
1 | Eco-innovation performance

The analysis in this section is based on the EU 28 Eco-innovation Index (Ecol Index) for the year 2017. The Eco-innovation index demonstrates the eco-innovation performance of a country compared with the EU average and with the EU top performers. Ecol Index is a composite index that is based on 16 indicators which are aggregated into five components: eco-innovation inputs, eco-innovation activities and eco-innovation outputs as well as environmental outcomes and socio-economic outcomes.

![Figure 2.1 EU28 Eco-innovation Index 2017, composite index](image)

Source: EIO, 2018

As illustrated above in Figure 2.1, in 2017 Croatia achieved a performance score that is 28% lower than the EU average, which places it 8th from the bottom in the EU-28 eco-innovation ranking. This ranks Croatia within the group of MS that are catching up on eco-innovation practices compared to the rest of Europe. Nevertheless, compared to 2015 when Croatia scored 61% of EU-average and was the fifth worst performing EU member, in 2017, Croatia rose 4 places with 18% improvement in eco-innovation. All measured components except for eco-innovation outputs increased in performance ranking since 2015. Socio-economic outcomes saw more than double of its value increased, more specifically it increased 55 points. Furthermore, eco-innovation inputs, even though well below EU average, rose by 67%.
The areas where Croatia performs relatively better compared to others includes eco-innovation activities, resource efficiency outcomes and socio-economic outcomes with scores of 93, 85, 95 respectively. All three indicators are close to the EU-average of 100 points.

**Eco-innovation activities**: In 2015, the data for two out of three indicators within eco-innovation activities were not available, which means the score relied solely on the number of “ISO registered organisations”. Now that this data is available, Croatia’s score increased by 7 points and falls just below the EU average. The lowest score is seen in eco-innovation inputs where Croatia has an index 75% lower than the EU average. Particularly low scores are seen under the indicator “Governments environmental and energy R&D appropriations and outlays” where Croatia scored only 13% of the EU average. Relative number of “Total R&D personnel and researchers” measured in percentage of total employment in Croatia is around half of the EU average.

**The Eco-innovation output**: this score is significantly better than the input score, which is 15% below the EU average. Again, the indicators that caused higher overall scores are “Eco-innovation related publications” and “Eco-innovation related media coverage” where Croatia scores 28% below and 15% above EU average, respectively. In an arguably more relevant indicator “Eco-innovation related patents”, Croatia still significantly lags behind the EU average by 92%.

**Resource efficiency outcomes**: Croatia scores 15% below the EU average at 85 points. In 2015, the “Water productivity” indicator received the lowest score among the resource efficiency (RE) indicators. However, in 2017, it was 29% above the EU average. In addition, “Energy productivity”, “Material productivity” and “GHG emissions intensity” are all below EU average, 13%, 31% and
18%, respectively. Initiatives regarding Green Public Procurement that started in 2015 could boost Croatia’s GHG emissions intensity above EU average in the future.

**Socio-economic outcomes**: As previously mentioned, the area where Croatia scored significantly higher than in 2015 is socio-economic outcomes. In 2015, Croatia scored 40% of the EU-average, while in 2017 that score increased to 95 points, which reflects significant improvement in performance. Two indicators “Employment in eco-industries” and “Turnover in eco-industries” were not available for the 2015 report. In 2017, these indicators are well above the EU average, which explains the significant increase in performance in this area. Finally, the indicator “Exports of products from eco-industries” is slightly above half of the EU average.

Considering all the above-mentioned analyses and trends, Croatia still has significant progress to make in order to decrease the gap in performance on eco-innovation inputs and eco-innovation outputs compared to EU averages. This is also an indication for the importance of public policies and funding, with regards to eco-innovation performance in upcoming years.
2 | Selected circular economy and eco-innovation areas and new trends

In Croatia, certain areas of progress can be observed during 2016-2017 with regards to waste management, renewable energy and eco-labelling.

**Waste management**

When analysing trends in waste management in Croatia, it is important to highlight the significant progress made in the waste-water treatment sector. Projects in the water sector that are financed by the Operational Programme Environment (OPE) for the period 2007-2013 were still ongoing in 2016, while new Operational Programmes for the period 2014-2020 financed water projects through the Operational Programme for Competitiveness and Cohesion (OPCC). The objective of these projects were to improve wastewater collection and treatment services at the municipality level, including the extension and reconstruction of the wastewater network. This has resulted in an increased connection rate to the public sewerage systems and an increased amount of waste water treated at an appropriate level after collection.

**Renewable energy**

In the renewable energy domain, Croatia has already achieved its 2020 targets for renewable energy and the reduction of greenhouse gas emissions, mainly due to its strong hydropower sector. Furthermore, in 2016-2017, Croatia’s Programme on energy renovation of public sector buildings introduced an integrated renovation concept, which includes renovation of buildings, upgrades to the heating /cooling system, water heating system, ventilation, lighting and water supply. Also, Croatia recently received financial support from the EU for the construction of a liquefied natural gas terminal at Krk (over €100 million of EU funding). This will help to diversify the sources of energy supply in Croatia and the wider region and make its energy markets more competitive.

**Eco-labelling**

In 2014, a regulation on the EU Ecolabel was issued to better define the EU Ecolabelling process. In 2015, the Fund for Environmental protection and energy efficiency provided financial grants to the companies willing to fulfil conditions and apply towards obtaining the EU Eco-label. Since then, a growing number of companies have been encouraged to adopt and improve their products in accordance to the EU Ecolabel criteria. Ecology 108 was the first Croatian company awarded with the EU Ecolabel in 2016. This was a recognition of their excellence for products with low environmental impacts through reduction of energy consumption, biodegradability, control of noxious gas discharge, responsible use of resources and disposal after usage.

There is also an initial positive trend regarding the implementation of Green Public Procurement (GPP) Plan. This started in 2016, and out of total public procurement in Croatia, GPP accounted for 0,4%.
With regards to other labels and standards, there is a significant growth of ISO 14001 certified Croatian companies as shown below in Figure 2.4. The ISO 14000 family of standards provides practical tools for companies and organisations looking to manage their environmental responsibilities.

**Figure 2.4 Number of ISO 14001 certified organisations in Croatia (2007-2016)**

![Graph showing the number of ISO 14001 certified organisations in Croatia from 2007 to 2016](image)

*Source: International Organisation for Standardisation (ISO)*

At the EU level, the European Commission provides a practical instrument for companies and other organisations to evaluate, report, and improve their environmental performance, known as the Eco-Management and Audit Scheme (EMAS). It is one level above the ISO 14001 standard, and helps organisations optimise their internal processes, achieve legal compliance, reduce environmental impacts and use resources more efficiently. Currently, no Croatian companies or organisations are part of the EMAS Register, however the Croatian Agency for the Environment and Nature is actively promoting it on the Croatian market.

Specific examples of eco-Innovation projects/products/services currently taking place in Croatia are provided in the following boxes:
CROATIAN CHAMBER OF ECONOMY, GREENOMED

On February 1\textsuperscript{st} 2017, the Croatian Chamber of Economy (Varaždin commerce) started the GREENOMED project, which is co-financed by the European Regional Development Fund (ERDF) within the MED program. With a budget of EUR 2 million, the project will include 11 partners who will participate for 30 months, up until mid-2019. Production is considered an important part of the European economy, which is also responsible for hazardous emissions. This is why implementing green practices in production is a priority for the future. GREENOMED’s mission is to demonstrate a methodology using the quadruple helix model, which will be implemented through a pilot initiative, the “Vanguard ESM Pilot Initiative”. The pilot project will identify and design projects with strategic innovations supporting the “green growth” of production in the Mediterranean region. Workshops and meetings have already been held in Ljubljana, Varaždin and Milan.

Key words: green growth, efficient and sustainable manufacturing, greenomed
Website: https://greenomed.interreg-med.eu/
Contacts for further information: https://greenomed.interreg-med.eu/

ECOLOGY 108, EcoBianco

Ecology 108 is a Croatian company based in Pula that devotes a significant part of its profits to help the development of love and respect for all living beings. Their main product, EcoBianco, is a laundry powder for washing machines which is performing at 20°C. This results in a great reduction in energy consumption. During the wash with EcoBianco, laundry doesn’t need softener, hygieniser or double rinsing. This diminishes the impact on the environment, energy consumption and the risk of developing dermatitis caused by contact or exposure to aggressive substances. It also eliminates smells and 100% hygienic through the release of active oxygen.

EcoBianco has obtained the European Ecolabel certificate in the category ‘Laundry Detergents’ because of the low environmental impact of the product including the production and the packaging.

Key words: reduction in energy consumption, laundry powder, Ecolabel
Website: http://ecology108.com/en/main/
Contacts for further information: Željko Belec, director, info@ecology108.com

PARK SPLIT HOTEL, Responsible Business for a Clean World

“Responsible Business for a Clean World” is a project initiated by the Park Split Hotel in cooperation with the Network of Associations of Persons with Disabilities (NAPD) Dalmatia and co-financed by the European Union, from European Social Funds. As a result of this cooperation, the first factory of recycled soap “Sapo”, which employs 46 individuals with disabilities in Europe was opened. The total project value is 188,865 EUR (about 70% financed by the EU). In Croatia, tourism is one of the most important industries, but it carries significant negative impacts on the environment. Analysis of 5 collaborative hotels showed that on an annual basis, 5.4 tons of half-used soap is generated and goes to waste. In addition to reducing the harmful impact on the environment, one of the results of this project is to improve the competitiveness of the hotel sector and a reduction in operating costs of up to 15%. The project aims to send a strong social message and improve sustainable social development at all levels.

Key words: recycled soap, responsible business,
Website: http://sapo-reciklirani-sapun.com/pages/sapo
Contacts for further information: Nikola Baričić, Jasenka Kovačić, soap@muosid.hr
Image source: http://sapo-reciklirani-sapun.com/pages/sapo

ENERGO MOBIL, Hvaljen Budi d.o.o.

The Croatian company Energo Mobil is a manufacturer of solar bus stations, solar trees, solar street lights, solar benches and solar-canopies. Their vision is to bring renewable energy sources closer to each individual and to improve and make life easier for Croatia’s citizens. Energo Mobil designs solar equipment for the needs of cities, smaller tourist resorts as well as solar LED lighting, whether it is to light city squares, streets or tourist destinations. Recognising the need for solar equipment when creating new spaces, providing alternative solutions, Energo Mobil cooperates with only top suppliers of equipment such as SUNPOWER, SMA, VICTRON ENERGY, in order to obtain superior and long-lasting products, constantly using the latest technological and design achievements.

Key words: solar bus stations, solar trees, solar street lights, solar benches
Website: www.energomobil.eu/en
Contact info: info@energomobil.eu

ECO-SANDWICH®

University of Zagreb, Faculty of Civil Engineering
Eco-Sandwich is a wall system developed as a result of the cooperation between Croatian scientific institutions and industry, under which extensive research was performed in order to develop a new competitive product, improve production facilities and thus sustain the competitiveness of involved companies on the market. Eco-Sandwich prefabricated wall panels have high durability, low operating costs and provide a number of advantages over competitive products. Panels are low-cost and enable rapid construction with high aesthetic value. The wall panels are both re-useable and fully recyclable. Eco-Sandwich has a vast potential to substantially improve energy performance of the deteriorating building stock thus facilitating a move towards reaching the EU’s 20-20-20 goals by 2020, creating new business opportunities and fostering a more innovative and competitive economy.

Key words: prefabricated wall panels
Project coordinator: Prof. Ivana Banjad Pečur, PhD.
Website: http://www.eco-sandwich.hr/
Contact info: banjadi@grad.hr


Overview of other products and services offered by Croatian companies as Eco-Innovative solutions in the period 2016 - 2017:

<table>
<thead>
<tr>
<th>Company name</th>
<th>Product /service</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><a href="http://www.greyp.com/">http://www.greyp.com/</a></td>
</tr>
<tr>
<td>Fabula</td>
<td>A pencil from recycled organic waste</td>
<td><a href="http://www.crowdfunding.hr/fabula-olovka-od-recikiranog-organskog-otpada-3333">http://www.crowdfunding.hr/fabula-olovka-od-recikiranog-organskog-otpada-3333</a></td>
</tr>
<tr>
<td>Solvis d.o.o.</td>
<td>Solar tree, solar bench</td>
<td><a href="http://www.solvis.hr/hr/">http://www.solvis.hr/hr/</a></td>
</tr>
<tr>
<td>Gumiimpex d.o.o.</td>
<td>Recycled car tires, participated in the realisation of the Ruconbar project</td>
<td><a href="http://gumiimpex.hr/">http://gumiimpex.hr/</a></td>
</tr>
<tr>
<td>Mi-plast d.o.o.</td>
<td>Recycling, biopolymer development projects</td>
<td><a href="https://www.mi-plast.eu/hr/">https://www.mi-plast.eu/hr/</a></td>
</tr>
<tr>
<td>iCat d.o.o.</td>
<td>Energy efficient and environmentally friendly ships</td>
<td><a href="http://icat.hr/">http://icat.hr/</a></td>
</tr>
<tr>
<td>Company Name</td>
<td>Product/Service Description</td>
<td>Website Link</td>
</tr>
<tr>
<td>--------------------------------------</td>
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<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Spectra media d.o.o.</td>
<td>Toner recycling machine</td>
<td><a href="http://www.spectra-media.hr/">http://www.spectra-media.hr/</a></td>
</tr>
</tbody>
</table>
[http://www.eco-sandwich.hr/hr/](http://www.eco-sandwich.hr/hr/) |
| Mobilisis d.o.o.                     | IT renewable solutions                                                                      | [https://mobilisis.hr/](https://mobilisis.hr/)    |
| Visiobike d.o.o.                     | e-bike                                                                                      | [https://www.visiobike.com/bike](https://www.visiobike.com/bike) |
| Mobile vechile technologie           | GRUNNER, smart electric bicycles                                                            | [https://www.mvt-solutions.com/](https://www.mvt-solutions.com/) |
| Freewa project d.o.o.                | Eco bottle, web i mobile application                                                        | [https://freewa.org/hr/#oprojekt](https://freewa.org/hr/#oprojekt) |
| Ekomobile d.o.o.                     | IT solutions for the environmental protection service (remote reading)                     | [https://www.ecomobile.hr/hr/o-nama](https://www.ecomobile.hr/hr/o-nama) |
| MikroGoran d.o.o.                    | IT solutions for the environmental protection service                                      | [http://mikrogoran.hr/](http://mikrogoran.hr/)      |
| Include d.o.o.                       | Smart bench                                                                                 | [https://www.include.eu/about](https://www.include.eu/about) |
| Tehnix d.o.o.                        | Technological solutions for waste management                                                | [http://www.tehnix.hr/](http://www.tehnix.hr/)      |
3 | Barriers and drivers to circular economy and eco-innovation in Croatia

Barriers

Four categories of barriers to the circular economy: cultural, technological, market and regulatory, exist in Croatia, with more or less impact. Those barriers are also interrelated, making it difficult to specify whether a certain barrier is more significant than another. For example, there is limited Green Public Procurement (GPP) funding/support, which results in limited funding for green/circular business models since firms may not be able to demonstrate convincingly that there is a market for their products in the absence of such procurement. This, in turn, may further undermine the development of a national consensus among policy-makers regarding transitioning towards a circular economy due to the absence of convincing use cases. As a result, regulatory barriers can lead to market barriers and vice versa.

In terms of cultural barriers, there is a lack of awareness and/or willingness to engage in circular economy principles from the general population. That being said, one can argue that the citizens would be more inclined to purchasing durable, green products if they were more readily available or partake in recycling if the infrastructure was available, nonetheless research shows that there is a general lack of consumer awareness and demand for such products and services.

Croatia’s territorial disparity (e.g. number of islands shape of the country) and territorial organisation (number of municipalities/counties) is another recurrent challenge to transitioning towards a circular economy. This national specificity makes the process of implementation of laws and regulations, as well as building infrastructure, even more difficult and complex to carry out.

Another barrier to a circular economy in Croatia is the lack of quality solutions and examples of good practices for connecting the private and public sector, especially in the waste management segment. Specifically, Croatia is still insufficient when it comes to investment in recycling and recovery infrastructure, as well as circular product eco-design and 3R production (re-use, recycle and repair).

An important barrier to eco-innovations in Croatia is the significant lack of investments in R&D. In 2016, R&D expenditure in Croatia represented only 0.84% of GDP. Some progress has been made through policy based on the Smart specialisation strategy, which promotes the creation of innovative products and services in five promising domains and 13 sub-thematic areas, but the results are still not visible.

Drivers

Certain factors (e.g. external government pressures, financial subsidies, technological capabilities, environmental organisational capabilities, a market-based instrument, competitive pressures, and demand for greener products) can be recognised as drivers for the development of eco-innovation. In Croatia, external government pressures and financial subsidies have been recognised as the main incentivising factors for the expansion of circular economy and eco-
innovation. One of the institutions that plays a key role in this is The Environmental Protection and Energy Efficiency Fund (EPEEF). EPEEF is the central point for collecting and investing extra budgetary resources in the programmes and projects on environmental and nature protection, energy efficiency and the use of renewable energy sources. It charges polluters of the environment (i.e. burdening the environment with waste) and users/consumers of natural resources. The financial resources include sources from foreign funds, international organisations, financial institutions and bodies, as well as national and foreign legal and natural persons, which are used for the financing of environmental protection and energy efficiency projects.

**Figure 2.3 Amount of funding by EPEEF for energy efficiency projects (2007-2016)**

![Bar chart showing funding by EPEEF](source: EPEEF)

As illustrated above in Figure 2.3., in order to address the needed changes with regards to waste management, the Croatian Environmental Protection and Energy Efficiency Fund (EPEEF) is continuously increasing its funding in programmes and projects regarding energy efficiency. With the co-financing help of the Environmental Protection and Energy Efficiency Fund, local authorities will be able to carry out remediation activities on a total of 299 municipal waste disposal sites.

Additional funding programs include HORIZON 2020 and COSME programme. Through HORIZON 2020 funding program since 2014, Croatia received EUR 48.26 million for 301 participants, including 22 SMEs (small and medium enterprises that received funding of roughly EUR 10 million). HORIZON 2020’s focus is on improving competitiveness of SMEs in Croatia through boosting production of innovative products, including in the field of eco-innovations.

Other two institutional circular economy and eco-innovation drivers are the Croatian Agency for the Environment and Nature (hereinafter: CAEN) and The Croatian Chamber of Economy (CCE).

- CAEN established a very useful online platform, the Waste Disposal Portal, which provides key information on how waste prevention (e.g. options, methods, measures, activities and results) can be communicated. As a part of the Portal, an application for voluntary
collection of data on the implementation of waste prevention measures by local self-government units (municipalities and cities) was established. Further, CAEN provided data and information on sustainability and environment, thus promoting environmental protection and sustainable development in publications such as the Environment and Environmental Report and Selected Environmental and Nature Indicators.

- The CCC monitors the development of policies related to the circular economy. In the 2016-2017 period it was involved in projects and activities whose objective was to promote the principles of the circular economy and the development of sustainability systems. In addition, CCC in cooperation with the Ministry of Environmental Protection and Energy is actively involved in the realisation of the Waste Exchange project. The project consists of a waste management tool and business model, which should contribute to speeding up the process of creating an economic environment that is based on more rational use of resources and the return of usable raw materials to production processes. CCC started with the Waste Exchange project in 2017, and its member companies are actively involved in its continuous evolution. Currently, the Waste Exchange does not meet all of the requirements of the economy, therefore certain changes are necessary in terms of alignment with the digital society (modernisation of services in terms of business connectivity based on supply and demand and/or definition of criteria and availability of information regarding the type and quantity of secondary material offers).
4 | Policy landscape in Croatia

Previously, Croatia was among the worst EU countries in terms of its waste management system as it had separated only 18% of total communal waste in 2015. At the time, the Waste Prevention Plan (WPP) was not yet in place and therefore lacked a suitable approach to waste prevention, even though some of measures were already being conducted.

Data from the Municipal Waste Report indicates that a total 1,679,765 tons of municipal waste were produced in Croatia in 2016. Annual quantity of municipal waste per capita amounted to 392 kg, or a daily amount of 1.07 kg per capita, which is an increase of 1.56% compared to the previous year. The share of mixed municipal waste in collected waste accounted for 74% or 1,251.299 tons. The share of other types of municipal waste in total municipal waste amounted to 26% (428,466 t), which is 2% more compared to the previous two years. Data by CAEN (Croatian Agency for Environment and Nature) showed that despite collective efforts from national, regional and local bodies to lower the quantity of municipal waste being generated and landfilled, the percentage of separately collected waste remains low. Approximately 30% of municipal waste is paper and cardboard, while estimations show that roughly 37% of total waste in households’ bio-waste. Furthermore, with the growth of electronic products and tools in households and the workplace, a new type of waste has been created. Electric and electronic (EE) waste is one of the biggest ecological challenges today and is becoming the fastest growing type of waste. EE waste causes two big issues: environmental degradation (i.e. if managed irresponsibly, materials such as chrome, cadmium, mercury, silicon, arsenic etc. can have very negative effects on the environment) and loss of valuable resources (i.e. a dozen valuable materials that could very well be re-used).

In order to catch up with the rest of the EU, Croatia needs to prioritise its national strategies. The scope of policy measures that support eco-innovations for the circular economy needs to be both more comprehensive and more focused in order to cover all relevant segments of the economy and regulations, such as:

- Regulatory instruments: regulations on eco-design, transparency of producers’ responsibilities;
- Economic instruments: charges and taxes for landfill without waste separation, incentives and subsidies for good practices regarding waste management and green public procurement, as well as for infrastructure investments;
- R&D funding: financially supporting circular economy related subjects and infrastructure, innovation incubators focused on green and eco-innovations; and
- Information, networking support and voluntary measures: advisory and information services for companies, start-ups, customers, professional training, qualifications and skills courses.

In order to address the previously mentioned issues, the Croatian government and other public institutions within the past two years launched a number of policies and initiatives for the development of a circular economy and eco-innovation. The most relevant policies include:
• Waste Management Plan of the Republic of Croatia for the period 2017-2022
• Environmental Protection Strategy and Plan (2017-2025)
• Strategy for Innovation Support (2014-2020)
• National Action Plan for Green Public Procurement for the period 2015-2017 (with a focus on 2020)
• Strategic Plan of Ministry of Economy, Entrepreneurship and Craft (2017-2019)

These initiatives are described in further detail in the following section.

**Waste Management Plan of the Republic of Croatia for the period 2017-2022**

The Croatian Government adopted (January 2017) the Waste Management Plan for the 2017-2022 period (as an integral part of its Waste Prevention Plan). The Plan regulates the collection and recycling of municipal waste, and should enable the development of the recycling industry and the creation of new jobs. This policy is thorough and well-written with eight specific measures such as the improvement of municipal and hazardous waste management systems, remediation of polluted sites, improvement of the waste management information system and supervision and administrative procedures in waste management. More specifically, the backbone of the Waste Management Plan consists of recycling yards and recycling centres with sorting and composting capabilities where waste can be prepared for recycling. The capacities and facilities of the waste management centres which will be built will have to be in line with the goals of the Plan. A feasibility study will be required for each waste management centre. The other important measures are the incentives for separating paper, cardboard, metal, glass, plastic and biodegradable waste. The Plan also envisages incentives for household and municipal composting, IT support to waste streams monitoring and a series of educational and informative measures. The clear objective of this effort is to reach a separate waste collection rate (including bio-waste, glass, plastic, paper and metal) of 50% by 2020, as stipulated by the EU’s Waste Framework Directive for Croatia. The executive bodies on the national level are the Croatian Agency for the Environment and Nature (CAEN) and Environmental Protection and Energy Efficiency Fund (EPEEF).

In order to achieve this target, as well as to finance the execution of the Plan, 5 billion HRK (680 million EUR) is needed. The indicative/planned sources of funding include:

- **Public sources (national budget, LSGU and RSGU budgets and public service provider funds and water service provider funds - owned by local self-government units):**
  - State budget – EUR 3.1 mil.
  - Local self-government unit (LSGU) – EUR 7.6 mil.
  - Regional self-government units (RSGU) – EUR 61 mil.
  - The Environmental Protection and Energy Efficiency Fund (EPEEF) - EUR 65.5 mil.
  - Croatian Waters (CW) - EUR 2 mil.
  - Croatian Agency for the Environment and Nature (CAEN) - EUR 0.25 mil.

- **Private sources:**
  - Private investments - EUR 12.5 mil. , which includes:
    - Private investments in all types of waste treatment
- Private investments in WMCs (public-private partnership, concessions etc.)
- Private investments in primary separation and waste collection - facilities for recycling and collection (public-private partnership, concessions etc.)
- Bank credits (The World Bank, European Bank for Reconstruction and Development, European Investment Bank etc.)

Environmental Protection Strategy and Plan (2017-2025)

The Environmental Protection Strategy and Plan includes specific measures for the protection, preservation and improvement of the value of natural goods and the environment in Croatia. The Plan’s objective is to support the Croatian transition to a circular economy with a focus on waste management, green public procurement, as well as implementing a 10-year framework for sustainable consumption and production programs and reducing the environmental footprint of products, services and organisations and R&D for innovative and green technologies, processes, and services. Its five goals are focused on increasing the effectiveness of basic nature protection mechanisms, reduction of direct pressures on nature and encouragement towards sustainable use of natural resources, strengthening capacity of the nature protection system, increase the knowledge and availability of environmental data and increase public awareness and support for nature protection.

National Action Plan for Green Public Procurement for the period 2015-2017 (with a focus on 2020)

Croatia is among 23 Member States that has developed a National Action Plan for Green Public Procurement (NAP-GPP). The purpose of the NAP-GPP is to encourage the public procurement system towards the procurement of products and services with lower environmental footprints. Green Public Procurement is increasingly emphasised in international and European strategic documents as an instrument that can contribute to “greening” the market and fostering the development of eco-innovation through the development of green products and services. It also introduces additional recommendations with regards to the EU Ecolabel, EMAS, Energy Star, etc. The document contains measures and actions for the 2015-2017 period, which was later extended for 2018-2020. In addition, NAP-GPP indicates the possibility of reaching its strategic goal for 2020 (50% of the public procurement procedures being conducted with the application of green indicators).


The Strategy for Innovation Support recognises that innovation is a key element for Croatia’s economic competitiveness, therefore the main national strategic goal should be to increase investments in knowledge, creativity and innovation. This Strategy does not have a specific focus on eco-innovation, but can potentially have influence on it. It targets improvement in Croatia’s innovation performance, increase in the share of R&D investments from the business sector and increase human capacity for research, technological development and innovation. In addition, its priorities is to encourage the development of new skills needed for research, technological development and innovation, provision of advisory services to entrepreneurs in the area of
research, development and innovation, and encourage the construction of a system based on scientific excellence and internationalisation. This policy gives a general framework for innovation development (such as development of the innovation system, establishment of a fiscal framework to foster innovation, stimulation of interaction between the scientific and private sector, facilitating access to financing for innovative enterprises, support of SMEs etc.).

**Strategic Plan of the Ministry of Economy, Entrepreneurship and Craft (2017-2019)**

This strategic document was published in January 2017 and lays out the main strategic goals with regards to strengthening Croatian economic growth. Tax reduction and reduction of administrative costs for the business sector, increasing the competitiveness of the economy by stimulating investment and innovation, and strengthening the competitiveness of Croatia’s trade activities within the EU’s internal market are the three most important goals of the document. This includes the digitalisation of Croatian industries, entrepreneurship and an innovative environment that attracts foreign and domestic investments, as well as more incentives and advisory for SME’s, etc. This plan aims in general to improve innovation, investment in R&D, entrepreneurship infrastructure and trainings.

In addition to the previously mentioned initiatives, other examples that demonstrate the adoption of circular economy measures include:

- Guidelines for Reuse in the Republic of Croatia (EPEEF),
- Waste Prevention Portal (CAEN), and
- Ordinance on By-products and Abolition of Waste Status and Ordinance on Construction Waste and Hazardous Waste.

Furthermore, another important stakeholder with regards to improvement eco-innovation and circular economy aspects is the Croatian Chamber of Economy (CCE). It is an independent professional and business organisation for all legal entities engaging in business within the Republic of Croatia. It was established in 1852 as an institution representing Croatian economic interests and the so-called continental Chamber system, with compulsory membership. Its entrepreneurship and innovation department aims to bring together businesses and the government to promote the economy and entrepreneurship. It represents the interests of small and medium-sized enterprises (SMEs), cooperates with educational institutions to organise appropriate training for entrepreneurs, and defines measures to improve the entrepreneurial climate in Croatia. The implementation of activities takes place through two strategic projects, both relevant for the improvement of eco-innovation and circular economy and are funded mostly by the Regional Development Fund:

a) **Strategic Project to Support Cluster Competitiveness Initiatives** is aimed at increasing the competitiveness and specialisation of the Croatian economy based on transformation and structural changes in the industry and the launch of commercialisation of innovation and internationalisation of the business sector through the strengthening of smart skills. In the period 2016 – 2017, an analysis of 13 sub-thematic areas was developed within 5 thematic areas defined by the S3 strategy. The analyses were developed in cooperation with international experts from the World Bank. The expected results are the increase of
competitiveness and improvement of Croatia's position within global supply chains through the implementation of cluster initiatives and identification of new brands in sub-thematic areas. Within the project, the Academy for Industrial Development will be established.

b) **Strategic Support Project to Establish Innovation Network for Industry and Thematic Innovation Platforms** is aimed at creating an efficient and self-sustainable support framework to encourage private sector investment in research, development and innovation as well as raising awareness of the importance of R&D and innovation in the business sector to identify new opportunities for industrial growth and job creation, improve competitiveness, modernise and diversify the Croatian economy. The activities will particularly focus on creating an institutional platform for R&D that will enable continuous entrepreneurial discovery and innovation dialogue between the public, business and scientific research sectors, companies and the scientific research community, to define long-term IRI business sector strategy for identified S3 thematic priority areas. Furthermore, educational and PR tools are provided to assist the business sector to apply the IRI activities' results to boost productivity and diversify the economy. Through the implementation of this project, Croatia will improve the national innovation system and link its stakeholders and establish effective communication between the public, scientific and research and business sectors. This will contribute greatly to more effective collaborations on research, development and innovation activities and help to foster the strengthening of knowledge and skills of the business sector in the field of research, development and innovation.

These projects focus on strengthening smart skills, increasing competitiveness, and R&D platform that will provide significant entrepreneurial and innovative growth that is directly correlated with eco-innovation. The project leader is the Ministry of Economy, Entrepreneurship and Crafts. All results and analysis are made under this ministry's competence, while data can be found on the CIRAZ page (https://www.ciraz.hr/).
References


Košak, M., 2016, Croatia among the worst in waste management in the EU - 62 organisations sent a proposal of the solution to the Ministry, Green Action, Friends of the Earth Croatia


## ANNEX: Policy measures addressing circular economy and eco-innovations in Croatia

<table>
<thead>
<tr>
<th>Group of policy measures</th>
<th>Type of policy measure</th>
<th>Specific measure</th>
<th>Focus of policy measure (tick if relevant)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Please provide reference to or brief summary of specific measures (national, regional)</td>
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<td></td>
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<td>add cells if necessary</td>
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</tbody>
</table>
|                         | Publicly co-funded venture capital funds | - Croatian Private Equity and Venture Capital Association (CVCA) – Facilitates private equity and venture capital investments in Croatia and South East Europe. CVCA organises events of the Venture Xchange South East Europe and aims at improving the investment environment in Croatia and the region.  
- HAMAG-BICRO (Croatian Agency for SMEs, Innovations and Investments) is a government agency that promotes foreign investments in SMEs and publishes a catalogue of private companies looking for equity investments | Circular economy: X  
Generic focus on eco-innovation: X  
Resource efficiency improvement: X  
Energy efficiency improvement: X  
Reduction of emissions incl. CO2: X  
Other relevant areas (e.g. renewable energy, etc): X |
| Equity/business support | Publicly co-funded venture capital funds | The Government provides guarantees to the Croatian Bank for Reconstruction and Development that supports SME sector, energy efficiency projects and renewable energy, among other activities. The Environment Protection and Energy Efficiency Fund grants financial resources for projects, programmes and activities on the basis of completed public contest. | Circular economy: X  
Generic focus on eco-innovation: X  
Resource efficiency improvement: X  
Energy efficiency improvement: X  
Reduction of emissions incl. CO2: X  
Other relevant areas (e.g. renewable energy, etc): X |
| Support for R&D in public sector and industry | R&D funding | HORIZON 2020 - The EU Framework Programme for Research and Innovation  
European Structural and Investment Funds: Operational Programme Competitiveness and Cohesion 2014-2020  
HAMAG-BICRO – Croatian Business Development Agency provides funding for SMEs through several programmes; Proof of Concept (PoC) – the programme supports entrepreneurs in the early development phase of new products, services and processes (pre-commercial activities) | Circular economy: X  
Generic focus on eco-innovation: X  
Resource efficiency improvement: X  
Energy efficiency improvement: X  
Reduction of emissions incl. CO2: X  
Other relevant areas (e.g. renewable energy, etc): X |
RAZUM – Programme that supports development of knowledge-based companies and provides financing to start-up or established SMEs that apply research in developing new or improved products and services.
IRECO – Programme that encourages SMEs to cooperate with scientific and research institutions
EUREKA – program that supports the cooperation of SME with the international partners in R&D activities
EUROSTARS – common initiative of EK and EUREKA; precondition is cooperation in R&D of minimum two counties

HAMAG-BICRO provides funding to public sector through several programmes:
- Proof of Concept Grant - supports scientists and researchers from Croatian universities and institutes to help turning the scientific results into a commercial potential. This programme supports established and start-up businesses and university spin-outs for developing innovative products and processes.
Technology Infrastructure Development Programme (TEHCRO) – aims at increasing the competitiveness of Croatian economy through development of effective institutions that would create favourable environment for technology transfer and increase the opportunities for growth and sustainability of innovative technology companies, in particular those that arise as the “start-up” or “spin-off” companies, with its foundation based on knowledge, the results of scientific research and the use of new technologies.

Program TEHCRO has four program lines:
- Technology Incubators
- Technology and Business Centres
- Centres of Competence
- Research and Development Centres
- Technology Oriented Projects (TEST Programme) - provides government subsidies to applied research in the field of technology with the emphasis on encouraging hi tech development.

Collaborative grants
Croatia participated in the EU’s Competitiveness and Innovation Framework Programme (CIP) from 2007-2016
Croatia has been a member of the EU COST Programme since 1992.
Croatia participates in the EU EUREKA Programme and TEMPUS Programme.
### Fiscal Measures

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
<th>Eligibility</th>
<th>Project</th>
<th>Innovation</th>
<th>SMEs</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R&amp;D Infrastructure</strong></td>
<td>Costs related to R&amp;D infrastructure are eligible under HAMAG-BICRO programmes</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
| **Tax Incentives for R&D and Start-ups**                                   | - Profit tax base can be lowered by 150% of the eligibility cost for fundamental research, 125% for industrial research and 100% for development research  
- For SMEs, further 20% for industrial and development research can be applied, and for medium-sized companies additional 10%  
- Most tax incentives went to big companies according to 2008–2009 data and 90% went to companies located in the capital city and county of Zagreb (Svaljek, 2012) | X           | X       | X          |      |                                      |
| **Tax Incentives for R&D Personnel**                                       | Eligible costs include salaries and reimbursements for employees directly participating in research                                                                                           |             |         |             |      |                                      |

### Education, Training, and Mobility

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
<th>Eligibility</th>
<th>Project</th>
<th>Innovation</th>
<th>SMEs</th>
<th>Data Source</th>
</tr>
</thead>
</table>
| **Tailored Training Courses for Companies, Entrepreneurs**                 | Centre for Entrepreneurship Osijek offers educational trainings for entrepreneurs, consulting and advisory regarding EU projects, and specialised seminars  
Development Agency Zagreb offers training and personal counselling, mentoring ideas, technical assistance for entrepreneurs | X           | X       | X          |      |                                      |
| **Advise/Consulting for Start-ups, Companies, Entrepreneurs**             | Business and Innovation Centre of Croatia (BICRO) provides advice for SMEs  
 Croatian Chamber of Trades and Crafts provides professional advice to craftsmen daily and personally, by phone, e-mail, mail or by visiting CCTC. Advice is also given to future craftsmen, in particular instructions on opening crafts, business form, joint trades, business, temporary suspension and business obligations. | X           | X       | X          |      |                                      |
<p>| <strong>Placement Schemes for Students</strong>                                         |                                                                                                                                            |             |         |             |      |                                      |</p>
<table>
<thead>
<tr>
<th>Networks and partnerships</th>
<th>Support for R&amp;D workers recruitments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Competition centres, clusters, science-technology parks</td>
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<tr>
<td></td>
<td>Biosciences Technology Commercialisation and Incubation Centre – BIOCentre, is developed in partnership between BICRO, the University of Zagreb and the city of Zagreb with support of the Instrument for Pre-Accession Assistance (IPA).</td>
</tr>
<tr>
<td></td>
<td>The aim of the BIOCentre is to facilitate cooperation between basic and applied scientific research and industry, technological infrastructure and new biotechnology companies in the process of developing new products.</td>
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<td></td>
<td>Centre for Technology Transfer, Zagreb, supports SMEs</td>
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<td></td>
<td>Rudjer Innovation, provides services regarding the Intellectual Property Rights</td>
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<td></td>
<td>The Technology Park Zagreb provides support to their members in terms of workplace, technical support, business consulting etc.</td>
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<tr>
<td></td>
<td>X</td>
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<tr>
<td></td>
<td>Technology platforms and innovation networks</td>
</tr>
<tr>
<td></td>
<td>Genius Croatia is a platform for the promotion, presentation and commercialisation of Croatian innovative projects, ideas, inventions, people and teams, as well as their connections with the domestic and international market, capital and media.</td>
</tr>
<tr>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Foresight and common vision building</td>
<td></td>
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<tr>
<td>Market intelligence and other forms of information sharing</td>
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<td>--------------------------</td>
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<tr>
<td></td>
<td>The Strategy for Innovation encouragement of Croatia 2014-2020</td>
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<tr>
<td></td>
<td>Act on Renewable Energy Sources and High Efficient Cogeneration (2015)</td>
</tr>
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<td></td>
<td>Draft of Smart Specialisation Strategy 2015</td>
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<tr>
<td></td>
<td>Environmental Protection Strategy and Plan (2017-2025)</td>
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<td></td>
<td>Waste Management Plan of the Republic of Croatia 2017-2022</td>
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<td></td>
<td>(with a focus on 2020)</td>
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<td></td>
<td>Strategic Plan of Ministry of Economy, Entrepreneurship and Craft (2017-2019)</td>
</tr>
<tr>
<td>Performance standards, labelling, certification</td>
<td>EU Ecolabel</td>
</tr>
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<td></td>
<td>Energy Star</td>
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<table>
<thead>
<tr>
<th>Public procurement</th>
<th>“Green” public procurement of goods and services</th>
<th>GPP2020 is being implemented in Croatia since 2015</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>R&amp;D procurement</td>
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<td></td>
<td>Pre-commercial procurement</td>
<td></td>
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<tr>
<td></td>
<td>Financial or fiscal support for technology adopters</td>
<td>(e.g. grants for purchasing new technology)</td>
</tr>
<tr>
<td>Support of private demand</td>
<td>Tax incentives for consumers (e.g. for purchasing environmentally efficient products)</td>
<td>X</td>
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<td>---------------------------</td>
<td>----------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td></td>
<td>Tax reductions for products and services (e.g. VAT reductions)</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Demand subsidies (e.g. eco-vouchers, consumer subsidies)</td>
<td>X</td>
</tr>
<tr>
<td>Environmental Protection and Energy Efficiency Fund initiated “Program of family houses energy renewal”. It gives subventions to 80% for improving energy efficiency of private houses and public buildings. The fund also co-finances purchases of electric and hybrid cars.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>In 2017 Environmental Protection and Energy Efficiency Fund continues to give subventions to people purchasing hybrid and electric cars, as well as A+++ (energy efficient) products.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Awareness raising and information provision</td>
<td>The Waste Disposal Portal was developed as a part of the project System Development Plan for the Prevention of Waste Generation and information exchange. The objective of the waste prevention and information exchange and good practice exchange is to contribute to achieving the goals of waste prevention. Specific objectives are the development of a system for preventing waste generation by exchanging data and informing and exchanging good practices between competent bodies, business entities and citizens.</td>
<td>X</td>
</tr>
</tbody>
</table>
About the Eco-Innovation Observatory (EIO)

The Eco-Innovation Observatory (EIO) is the initiative financed by the European Commission’s Directorate-General for the Environment. The Observatory is developing an integrated information source and a series of analyses on eco-innovation trends and markets, targeting business, innovation service providers, policy makers as well as researchers and analysts.

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