Eco-innovation in Croatia

EIO Country Profile

2014-2015
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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 2014-2015: 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 and is not an exhaustive source of information on innovation at the company level.

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Summary

Croatia’s environmental and socio-economic issues indicate that Croatia is only beginning its transition from a linear to a circular economy. Six years period of economic recession, a general lack of adequate policies and competences, and a regulatory framework that remains only partially adjusted to EU regulations all contribute to Croatia’s lag in eco-innovation and in its transition towards a circular economy.

In 2015, the composite Eco-innovation index for Croatia was 67% of the EU average. This places Croatia among five least eco-innovative countries in EU, occupying the same sphere as it did in 2013. Eco-innovation input stands very low at 21% of the EU average, which is also almost unchanged since 2013. Croatia achieved its highest score in eco-innovation activities, where it reached the EU average. Yet this outer layer might be explained by a lack of data for some of the indicators. Croatia is still showing modest results in socio-economic outcomes, but some of the indicators show certain improvements compared to 2014.

These results confirm that there is still no long-term involvement in the push to transition to a circular economy at the national and local level, as well as at a business and consumer level. In order to achieve a sustainable, resource efficient and competitive economy Croatia needs to address this process as a priority and start acting accordingly. The biggest and the most urgent challenge for the country lies in waste management, which requires on radical changes – namely leaving behind old practises and focusing on separate waste collection. Much more needs to be done in the area of information provision and education on the local level. Some improvements can be recognised in the fields of energy efficiency and renewable energy. Step towards more efficient innovation system was the Strategy for Innovation encouragement of Croatia 2014-2020, which defines the mechanisms for stimulating innovation and application of new technologies.

There exists broad based consensus that the transition to a circular economy presents a great challenge for Croatian policy-makers, national and local authorities, as well as to economic actors, such as business and consumers. Yet, there exists growing awareness among these actors that current circumstances, briefly presented in this report, demand systematic change in business and market models, product design, ways of transferring waste to resources, and in the producers and consumers’ related values and behaviour.
Introduction

Eco-innovation development and the transition to a circular economy in Croatia are still at their early stages. Policies that should facilitate transition from a linear to a circular economy are largely underdeveloped. Yet, policy-makers in the responsible institutions emphasize ever more an orientation towards a circular economy as one of their main strategic goals. Putting a strong focus on the transition to a circular economy can be justified given the current Croatian environmental and socio-economic issues to which this strategical orientation, to a significant extent, may present a solution.

Since 2008 Croatian industry production has been continuously decreasing. Finally in 2014 production grew by modest 1.3% and continued growing in 2015 by 2.6%. Despite the recent trend of growth in last two years, the current level of the industry production is 15% less than it was in 2008. Due to the decrease in economic activity, financial means needed for developing and implementing policies that address circular economy concerns have been reduced, particularly on the local level. A prolonged economic recession is also in large part responsible for slow and insufficient development of clean technologies and eco-innovations in Croatia. Next to recession, the factor that certainly contributed to unsatisfying development in these areas is the lack of targeted eco-innovation policies.

The main environmental issues in Croatia lay in inadequate waste management and inefficient usage of resources. Due to a lack of successful solutions and an unsuccessful enforcement of laws and regulations, most Croatian municipalities have alarming problems with all sorts of waste. Thus, it is important to stress the importance of solving waste management issues, particularly municipal and hazardous waste, as an absolute priority for Croatia, especially given its function as one of the crucial elements of a circular economy.

Water utility systems in Croatia suffer from significant water waste, which amounts to 48%, according to the latest official data. Furthermore, despite advantageous geographical preconditions, the amount of energy produced from renewable resources, particularly energy from sun and wind, remains minimal.

Demographic data for Croatia in the context of space usage shows an alarming trend of population decline, yet there exists a significant increase of 17% in artificial areas, which indicates a high demand for more living space and consequently a bigger consumption of natural resources.

In order to reverse the above presented trends, recent research as well as the interviews with relevant informants, indicate that there is a growing awareness among the policy-makers of the need to transition to a circular economy, which is increasingly being recognised as necessary for ensuring sustainable development, a more competitive economy, and better resource efficiency.

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1 Newly appointed Minister of Environment and Nature protection in one of his first public speeches has referred transition to Circular economy as a priority of his mandate
2 Data provided by the Croatian bureau of statistics
3 Source of data is 2014 Report on the state of environmental protection
4 In last two decades population decreased for 10.7%
5 Interviews are conducted with the relevant officials form the Ministry of Entrepreneurship and Crafts, Ministry of Environmental and Nature Protection and Chamber of commerce
1 | Eco-innovation performance

The analysis in this section is based on the EU-28 Eco-innovation scoreboard (Eco-IS) for the year 2015. Via its composite Eco-innovation index, produced by the Eco-Innovation Observatory (EIO), Eco-IS demonstrates the eco-innovation performance of a country compared with the EU average and with the EU top performers. Eco-IS is based on 16 indicators, aggregated into five components: eco-innovation inputs, activities and outputs, environmental and socio-economic outcomes.

For the year 2015 Croatia is ranked low among the EU-28 countries in terms of eco-innovation performance, as illustrated above in Figure 1. The country has achieved an index 33% lower than the EU average. This places Croatia fifth from the bottom in the EU-28 ranking of eco-innovation. The same ranking Croatia held in 2013 when it achieved 66% of EU-average. The score in most of the components did not change significantly. A minimal change, up to 10 points, occurred in eco-innovation inputs, eco-innovation output and resource efficiency.

The component in which Croatia performs relatively better comparing to other areas is eco-innovation activities where it reached EU-average. Its score has increased by 15 points compared to year 2013. However, the data for two out of three indicators within the component are missing. Therefore, the score relies solely on the number of “ISO registered organisations”, which may not reflect the actual state of eco-innovation activities in Croatia. The lowest score is achieved in eco-innovation inputs where Croatia has an index 79% lower than the EU average, which presents one percentage point decrease compared to year 2013. Particularly low scores are seen under the indicator “Governments environmental and energy R&D appropriations and outlays” and “Total value of green early stage investments”, where Croatia’s score amounts to 5% and 7% of the EU
average, respectively. 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 score is significantly better than the input score accounting to 11% 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 14% below and 62% above EU average, respectively. In an arguably more relevant indicator “Eco-innovation related patents”, Croatia still significantly lags behind the EU average by 81 percentage points.

Figure 2 Components of the eco-innovation composite index for Croatia, 2015

Source: EIO, 2016

In resource efficiency outcomes, Croatia places at 80% of the EU average. Among the indicators for resource efficiency, the highest score reaching EU average is achieved in “Energy productivity”, while the lowest is in “Water productivity” where the score is only 45% of the EU average. “GHG emissions intensity” and “Material productivity” is lower than EU average by 6% and 19%, respectively.

The only component in which Croatia scored significantly better than in 2013 is socio-economic outcomes. In 2013 Croatia scored a modest 10% of the EU-average, while in 2015 that score increased to 49% of the EU average. The only indicator used for this component is “Exports of products from eco-industries” expressed in percentage of total exports. Data for two other indicators “Employment in eco-industries” and “Turnover in eco-industries” are not available for the year 2015.
2 | Selected circular economy and eco-innovation areas and new trends

In 2015 certain areas of progress can be identified in waste management and in increasing resource efficiency, which are both priority issues in Croatian environmental politics. Improvements can also be observed in other areas such as renewable energy, improving air-quality and eco-labelling. However, improvements are relatively modest, which confirms the data analysed in the previous chapter and the results of some studies.

**Waste management** presents the most serious environmental issue for Croatia. An almost decade year old plan to build 13 Centres for waste management by 2018 has still not been revised. By the end of 2015, only two of the centres have been completed. Croatia agreed to sort at least 50% of waste by 2018 and the proposed 13 Centres for processing mixed waste are perceived by experts as incompatible with that goal. According to data provided by the Croatian Ministry of Environment and Nature Protection, 54 million EUR has been invested in waste collection and sorting to date. In 2015, 18 thousand green islands (where separately collected waste is stored) were installed, 108 recycling centers are in construction, and another 481 are planned for the next period. At the moment, almost 80% of citizens carry out some basic waste selection, which is a significant increase compared to 2012 when only 45% of the population sorted out their waste. Separate collection takes place mainly by “bring back systems” including paper, glass and plastic packaging at collection points. Bio-waste is only collected by a few pilot separate door-to-door collection systems in selected neighbourhoods. Therefore, there has been no significant progress made in bio-waste collection since 2013. There are no economic-incentives provided to consumers for reducing the amount of household waste nor any highly visible awareness campaigns in Croatia. According to recent study entitled “Assessment of separate collection schemes in the 28 capitals of the EU”, Zagreb (capital of Croatia) has the lowest collection rate of fractioned waste, amounting to just 5 kg/cap (1%). In 2016, improvements are envisioned through a new Plan for waste management, changes in the Law for sustainable waste management, and through new regulation for municipal waste. Changes are already in preparation and some of the policies are currently in the phase of public discussion.

In 2014, Croatia adopted the Third national action plan of energy efficiency for the period 2014-2016. Within the framework of the action plan, an “Energy Renewal Program of Homes” was developed and implemented by the Environmental Protection and Energy Efficiency Fund. The aim is to increase the energy efficiency of existing houses, reduce the energy usage and emissions of CO2, and consequently reduce costs for consumers. The implementation of this program had a positive impact on local economies generating growth in their economic activities. Progress can be seen in improvements meant to improve energy efficiency in the public sectors, with notable improvements being the adoption of energy efficient street lighting, and investment in energy renewable kindergartens, schools, hospitals etc. Furthermore, the Ministry of Environment and Nature protection also co-finances purchases of electric and hybrid cars. In addition to subsidies for cars, cleaner public transport is also supported by the government.

In October 2013, the Environmental Protection and Energy Efficiency Fund and UNIDO signed an agreement of cooperation and co-financing the “Plan for gradual decrease and eliminating consumption of the substances that are destroying the ozone in Croatia”. The main objective of the plan was to carry out retrofitting of old devices in public buildings. According to the most recent
calculations, the decrease in global warning with the implementation of the plan amounts to 4,243,813 kg GWP eq. The project was finalized in 2015.

Energy produced from the **renewable resources** in Croatia amounts to 28,7% of overall energy output in Croatia, from which 26% comes from hydroelectric power plants, while the energy produced from the other renewable resources amounts only to 2,8%\(^6\). At the moment, there are 1207 functioning renewable energy power plants producing up to 4301 MW of power\(^7\). Compared to the beginning of 2015, this presents an increase of 137 power plants: 130 solar power plants, one hydroelectric power plant, three power plants for biomass and three on biogas. Another 138 plants will be activated producing up to 502 MW of power. Investors have shown great interest, and quotas determined by the National plan for renewable energy resources for 2020 for building wind and solar power plans are already filled. However, it is important to emphasize that there are also many complaints from business and NGO sectors about too low quotas, particularly for solar energy. They stress Croatia’s ability, coming from its geographical position, to produce significantly more solar energy.

Croatia has been fairly active in the production of biofuels. However, in 2015, the EU introduced a directive that prohibits subsidies to producers of biofuels. Bio-fuel producers state that these policy developments threaten their survival and they have already reduced production of biofuel. This may indicate that the market of biofuel and other bio-based materials in Croatia is still not established.

In 2014, a Regulation on the **EU Ecolabel** was issued to describe the EU Ecolabel process in Croatia. The Ministry of Environment and Nature Protection also operates a national eco-label “Friends of environment”, which was established in 1993. More and more companies are applying for these eco-labels and are willing to adopt and improve their products to comply with the criteria. In 2015, the Fund for the Environmental protection and energy efficiency provided subsidies to the companies that applied and fulfilled conditions for gaining the label. The same measures will be applied in 2016.

In the field of **water management**, the focus is still on the construction of devices for cleansing wastewaters and on the improving the canalization network. Croatia is rich in water resources, however its periodical and territorial allocation is unbalanced, presenting a significant problem particularly during the summer. Much less has been done to promote and establish secondary water reuse. The market for **secondary water reuse**, as well as for secondary raw materials, is in its initial phases. In order to boost these markets, goals of water management in Croatia need to be reset and adopted to those of a circular economy.

\(^6\) The goal set within the Strategy for the sustainable development of Croatia is 5,8%

\(^7\) Data is published in August 2015 by Croatian Energetics association in the Study about the state of renewable energy projects in Croatia
In Croatia, investments in research and development are still relatively low, particularly in the corporate sector. According to the latest data from Eurostat, of all investments in research only 42.8% comes from investments made by private sector entities. Only 5.7% of the all investments relate to market oriented projects. In addition, there are still no visible improvements in connecting the academic and private sectors. With this mind, much is expected from the implementation of recently adopted strategical documents such as the Strategy for supporting innovation in Croatia 2014-2020 and Industry strategies in Croatia 2014-2020, and from the Smart Specialization Strategy that is about to be issued. Despite underdeveloped research and development and innovation systems in Croatia, there are some good examples of eco-innovative projects, mainly co-financed through EU funds.

**SELF PROP RAIL**

In Croatia, the self prop rail project brings a new, innovative self-propelled bulk carriage to the market that does not need a locomotive for shuffling/moving during the process of cargo unloading. The aim of the project is to remove barriers to market penetration of a self-propelled bulk carriage, which increases resource efficiency and reduces negative environmental impacts during railway maintenance/construction. The project should result in reduced resource needs (deployment of locomotives), energy consumption, and pollutant emissions resulting from railway construction and reconstruction.

The self-propelled bulk carriage is recognized as resource efficient way of the (re)construction of railways. The carriage saves energy, human resources and shortens the time of transportation and unloading. It is cost and time efficient, it enables point-to-point transportation, and it eliminates cost-intensive cargo manipulation machinery for freight handling or time-intensive coupling and reloading processes.

Key words: self-propelled bulk carriage, deployment of locomotives, resource efficiency.

Website: [www.selfproprail.eu](http://www.selfproprail.eu)

Contacts for further information: Dražen Vidović - director RZV, Producer drazen.vidovic@rzv.hr

Source: [www.selfproprail.eu](http://www.selfproprail.eu)
GREENBLAST

The Greenblast project has developed an innovative solution to recycle glass. The aim of the project is to prevent thousands of tons of waste going to landfill. Currently waste glass is collected from homes (and businesses) for recycling. Due to the lack of demand there is an excess of green coloured glass which must be stored or sent to a landfill. The Greenblast project proposes an eco-innovative process and business model to make use of the glass in two different industries through “double recycling”. Firstly, waste glass can be used in place of copper slag or grit for metal surface preparation. This technique called blasting forms a large part of shipyard work. Using recycled glass for blasting has been proven in small scale applications in previous projects. The waste from this process consists of glass powder containing metal and paint particles. Secondly, waste product from blasting is suitable for use in the heavy clay industry in the manufacture of bricks, pipes and tiles. The use of glass enables low temperature kiln firing and/or higher quality end products, which can reduce costs and the environmental impact. The planned results from this project include the following: the creation of a new market for green coloured waste glass which is currently stored or in landfill; the decrease of hazardous waste in the maritime industry and reduction of costs in processing waste streams; the conversion of a waste stream to an income stream in the maritime industry; lowering costs of raw materials for the heavy clay industry; and finally the real world testing of a new business model using waste glass.

Key words: Glass, Blasting, Fluxing Agent, Brick, Concrete

Website: www.greenblast.eu

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WASATEX

Wasatex stands for Water Saving Processes for Textile Production. The project aims to provide solutions in the textile sector for the treatment of wastewater by allowing for the recovery of wastewater, which can amount to 100%, in various stages of production. A textile factory in Osijek (Croatia) of belonging to the Olimpias Tekstil group was chosen for the industrial development of the project. With the addition of the new purifying units of the Wasatex project, up to 90% of the water can be reused in industrial processes and the amount of water pumped from the well will be lower than 65% (equivalent to a reduction of 1.020 m³/day). This allows for huge water savings, cost savings in water extraction and discharge, and cost reductions of primary water treatments (softening and iron removal filters).

The environmental benefits include the lower consumption of natural resources to heat the water (recycled water has a temperature of about 30 °C compared to a temperature of 15 °C for well water) as well as reductions of gas emissions and a cost savings in fuel. The Wasatex technology is tailor-made according to the characteristics of the water to be treated, to customer requirements and local restrictions.

Key words: textile sector, treatment of wastewater, water saving.

Website: http://wasatex.eu

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Source: http://wasatex.eu
Croatian company Tehnix is a leading waste management company in Southeast Europe for design, production, and the servicing of machines and equipment for waste treatment. TEHNIX owns more than 50 patents and innovations embedded into over 350 products, which are launched into the market as their own product or sold as a license or innovation.

Their most successful innovations are: PRESS CONTAINERS – solid waste compactors; PRESSES – BALING PRESSES; SEPARATORS – devices for physical water treatment; BIOROTORS – cutting-edge technology for biological water purification and MOBILE OIL PUMPS. In 2015 in Croatian city of Prelog Tehnix has built the factory using Tehnix methodology for minimizing amount of waste for disposal and implementing the newest technologies for waste separation as biorotors and special separators. City of Prelog is the most successful example for waste management in Croatia. It separates more than 50% of the municipal waste with the plan to increase it to 70% by 2020.

Key words: waste management, biorotors, separators.  
Website: www.tehnix.hr  
Contact info: tehnix@tehnix.com
3 | Barriers and drivers to circular economy and eco-innovation in Croatia

Croatia underwent a significant period of economic recession from 2008 until 2014, which had significant negative impacts on the scope of investments, including those in clean technologies. A major consequence of the recession included significantly less funds allocated for environmental improvements as well as for research and development in the environmental technologies sector. In 2014 and 2015 a modest growth of production was observed. Slow rates of growth are also predicted for the year 2016, however growth is highly dependent on external factors. Thus, access to investments for eco-innovation and circular economy development remain mainly provided through EU funds.

Within EU funding programs, the Competitiveness and Innovation Framework Programme (CIP) is considered very successful in terms of co-financing projects related to eco-innovation. CIP concludes at the end of 2016, but programs such as HORIZON 2020 and COSME which may further stimulate the development of eco-innovation. Some Croatian firms have increased their competitiveness through investing in modern technical and technological solutions, and therefore able to benefit from the opportunities through EU funds to further improve their innovative products. Eco-innovation could be further developed and promoted in Croatia. As mentioned in the previous chapters, there still exists no targeted eco-innovation policy. Current efforts of responsible bodies to support technological innovation in general (which primarily focus on the small and medium-sized business sector) may not be sufficient to improve eco-innovation. There are examples of businesses with eco-innovative products that are not fully recognizing their eco-innovation potential. For example, even though these companies produce products that fulfil eco-label criteria, they may not be have eco-label status due to the lack of information and/or complexity of the procedure.

Croatia has a relatively long tradition in the energy industry, particularly in electro-energetic systems. Dominant firms in the energy sector mainly produce specific equipment and are export-oriented. Their main problem (and a general problem of Croatian industry), however, is the lack of infrastructure for the industrial research, experimental development and for testing the compliance of their equipment and products with the EU norms and directives. Much more needs to be done in Croatia to improve the collaboration between research institutes, universities and the private sector.

Even though Croatia has significant potential to produce energy form renewable sources from solar and wind sources, the Energy Strategy of the Republic of Croatia from 2009 recognises coal as one of the principal resources of the Croatia energy system. In accordance with the Strategy, by the end of 2015 the national electricity company planned to start the construction of a large coal-fired power plant. This plan is part of the highly centralised energy production system in Croatia, which has been widely criticized by experts and environmentalists. These actors emphasize the fact that Croatia needs to turn towards a more decentralised and a “greener” system of energy production.

In March 2016, the Minister of Environmental and Nature protection announced that due to its noncompliance with EU energy policies and Croatia’s plans to reorient towards renewable energies sources in energy production, construction of new power plant on coal is probably going to be redefined or cancelled. A final decision on the future of the project has still not made as of April 2016.
Another threat to effective transition to a circular economy in Croatia may be found in its waste management practices. As mentioned previously, 13 Centres for waste management are planned to be constructed in Croatia by 2018. However, by the end of 2015 only two were completed and two of them were in advanced phase of construction. The Centres for waste management produce alternative fuel from waste used for generating energy. However, only around 35% of all the waste is used for that process, whereas the rest of the waste is disposed of in landfills. There is large debate in Croatia at the moment on whether to continue with the construction of the Centres. Some experts and the environmentalist are against it, arguing that the Centres as planned are not in line with circular economy because should the 13 Centres be built, there would be less of a need (or incentive) to recycle as the Centres would need a constant supply of waste to function. Experts stress that Croatia must decide between these two choices: minimization of waste and increase recycling or to construct those initially planned Centres to generate energy through burning of mixed waste. In addition, Croatia’s policy on waste management requires at least 50% separately collected waste by 2018. Therefore, with the above in mind, the currently set goals – the construction of 13 Centres for processing mixed waste and separate waste collection with the ultimate goal of zero waste - seem mutually exclusive. By the end of 2015, there was still no solution to these issues, but the Minister of Environment and Nature protection has expressed his intention to redefine the purpose of the Centres or to reduce the number to be constructed.

Another key barrier towards a circular economy identified in relevant research and also emphasized by stakeholders lies in the Croatian regulatory framework. The following circumstances are identified as the main issues:

- Current Croatian laws and regulations are not yet fully compliant with the EU regulation
- Most of the national strategies, which serve as the legal framework for the creation of laws and regulations, have not been updated and are not in compliance with the goals of circular economy. Moreover, their content tends to be complex and in some cases ambiguous.
- The process of development of some strategic documents has been relatively slow, which has had a negative impact on the state of the overall regulatory framework.8

In addition to the points above, another important issue lies in the failed implementation of laws and regulations, particularly in the field of waste management. The cause of the problem is the absence of political action to guarantee the enforcement of fines for breaking the law. One stakeholder stated that, “In the current situation, the minority of those who act according to the laws and regulations are disadvantaged, because those that break the laws are not being punished. Further, some of the lawbreakers are also the recipients of subventions and funds.”9

In addition to the political, economic and regulatory barriers, other serious challenges with Croatian transition to a circular economy is seen in its territorial characteristics (e.g. shape of the national borders, including 50 populated islands and two peninsulas), which add to the complexity of the process in terms of establishing efficient infrastructures.

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8 For instance, Strategy for smart specialization are expected to be approved only in summer, 2016. The same relates to new National plan for the waste management.
9 Quotation from the interview with one of the informants
4 | Policy landscape: towards circular economy in Croatia

In Croatia, the most relevant policies for the development of circular economy and eco-innovation include:

- Sustainable Development Strategy of (2009)
- Strategical plan of Ministry of Environment and Nature Protection 2015-2017
- National renewable energy action plan until 2020
- Strategy for innovation encouragement of the Republic of Croatia 2014-2020
- Third national plan for energy efficiency 2014-2016 and Waste Management Strategy

These initiatives are described in detail below.

**Sustainable Development Strategy (2009)** contains an analysis of the existing socio-economic and environmental state in Croatia and provides guidelines for long-term actions. It sets the principles and measures for achieving sustainable development. The main priorities are environmental protection, sustainable production and consumption, and energy independency. However, the strategy does not define the indicators to monitor the progress towards transitioning to sustainable development.

**Strategical plan of Ministry of Environment and Nature protection 2015-2017 (2014)** sets three main goals. Among the objectives under these main goals are the establishment of the preconditions for the successful waste management, ozone protection, climate change mitigation, continuous monitoring of the state of the environment and nature, and establishing more advanced systems for data management. Areas of less emphasis are renewable energies and the promotion of new forms of consumption and reduction of waste.

**National renewable energy action plan until 2020 (2013)** sets the guidelines for achieving the 20% target of renewables in energy consumption by 2020 as determined by the EU directive on renewable energy. The action plan was criticized by the academic community and other experts for its noncompliance with the Energy strategy of Republic of Croatia due to its refocusing from solar and wind energy to energy production from biomass, biogas, cogeneration plants and small hydroelectric power plants.

**Waste Management Strategy from 2005** is due to be replaced with a new Strategy in 2016. Even though it calls for the promotion of a waste management hierarchy, the current Strategy does not have clear goals regarding waste reduction nor does it set deadlines for achieving results. The strategy is mainly focused on energy capture and disposal, whereas much less guidance is offered for waste minimization, recycling and reuse. Its weak point is also in undefined measures for monitoring and control. Therefore, it can be concluded that new improved and adopted waste management guidelines are urgently needed as an overarching strategy for waste management and circular economy related regulations.
National Programme for Energy Efficiency for the period 2008-2016, adopted in 2008, includes three three-year action plans. The Third Action Plan (2014-2016) was launched in July 2014. The plan optimistically predicts the achievement of the standards set for 2016, which are the reduction of end-use energy consumption by 20% by 2016. In comparison to the first two plans, this plan has introduced a system of measurement and verification of obtained results.

The Strategy for Innovation 2014-2020 (2014) aims to increase the level of competitiveness of the Croatian economy and increase social well-being. The document includes a list of around 40 guidelines structured around four thematic pillars: (1) development of the innovation system and setting up a legal and fiscal framework to encourage innovation; (2) strengthening the innovation potential of the economy; (3) encouraging cooperation and knowledge flows between business and academia; and (4) strengthening of the human resources in innovation and creation of an attractive environment for world-class researchers.

Croatia has recently launched several other initiatives to improve the national innovation system. For example, the “National project for creating innovation networks for the industry and the development of thematic innovation platforms”, “Science and Technology foresight” and “Prediction of smart skills” are currently under development. The main focus of these activities will be on developing strategies for research, development and innovation in the business sector for each thematic priority area from the upcoming Strategy for Smart Specialization.

Croatia is currently in the process of finalizing a Smart Specialization Strategy, which was initially due for final approval at the end of July 2015. Two of the five priority thematic areas of the strategy are “energy and sustainable environment” and “food and bio-economy”. Initiatives under these priorities ultimately involve eco-innovation and seek to develop the whole entrepreneurial ecosystem in Croatia. The strategy also contains two horizontal thematic areas which are Information and Communication Technology (ICT) and Key Enabling Technologies (KET).

New Waste Management Strategy, Smart Specialization Strategy and other key regulatory documents that are in preparation and are planned to be issued in 2016 are in compliance with the EU action plan for the Circular Economy. However, it should be noted that certain measures and deadlines for their implementation set by the EU action plan are recognized by some stakeholders as too ambitious for Croatia.


The Energy Efficiency Act regulates efficient energy use, adoption of local, regional and national plans to improve energy efficiency and determines energy efficiency measures and requirements. The purpose of the Act is to achieve sustainable energy development, to reduce the negative environmental impacts of the energy sector, to improve the security of energy supply and to meet the needs of energy consumers and international commitments of the Republic of Croatia regarding reduction of greenhouse gas emissions by promoting energy efficiency in all sectors of energy consumption. The act defines obligations of the energy regulatory authority, distribution
and transmission system operators and energy market operators related to transmission, transport and distribution of energy. It also determines consumer rights regarding the implementation of energy efficiency measures.

**Act on Renewable Energy Sources and High Efficient Cogeneration (2015)**

The Act on Renewable Energy Sources and High Efficient Cogeneration was adopted in September 2015. The Act harmonizes Croatian legislation with EU regulation and consolidates Croatian legislation in the field of renewable energy. The purpose of the Act is to incentivize production and consumption of electric energy produced in renewable energy power plants, to explore possibilities of construction of electricity production facilities on the state property, to regulate the management of a register of projects and to stimulate international cooperation in the field of renewable energy. The main novelty of the Act is that it changes the model of incentives and instead of the present feed-in tariff system, a new concept of market premium model is introduced.

The new legislation brings more transparency to the system by regulating the management of a register of projects, project holders and eligible preferential producers of electrical energy. The register will be publicly accessible, thereby providing an overview of existing projects, obtained licenses and an updated status on quotas. The Act defines possibilities and tender procedure for construction of electricity production facilities using renewable energy or high efficient cogeneration on the state property. Furthermore, it contains rules on takeover of surplus of electrical energy from purchasers with its own production.

**National action plan for Green procurement (2015)**

The Croatian Government adopted the first National Action Plan for green public procurement in August 2015, for the period from 2015 to 2017. The aim of the National Action Plan for green public procurement is to include some of the criteria for green public procurement for 50% of public procurement procedures in Croatia by 2020. The focus is on the introduction of basic green standards in public procurement for priority groups of products and services: paper for printing and copying, motor vehicles, office and computer equipment, electricity, telecommunication services and mobile telephone services together with equipment, and cleaning services. The goal is to contribute to a cleaner and healthier environment, to stimulate the innovation and provide incentives to industry for the development of green products and services.
References


CEPOR Center development of SME, 2014, Report on the SME in Croatia for 2013, http://www.azo.hr/Publication08


Croatian Ministry of Science, Education and Sports, 2014, Croatian research and innovation infrastructure road map, https://www.google.hr/?gws_rd=ssl#q=smart+specialisation+strategy+croatia

Delomez Yann, 2012. Renewable energy in Croatia, Embassy of Belgium in Croatia – Economic and Commercial Office


# 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><strong>Please provide reference to or brief summary of specific measures (national, regional)</strong></td>
<td>Circular economy</td>
</tr>
</tbody>
</table>
| **SUPPLY SIDE FOCUS**   | 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 VentureXchange 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 | X | X | X | X | X |
|                         | Public guarantee 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. | X | X | X | X | 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) | X | X | X | X | X | X

- CVCA organises events of the VentureXchange 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.  
- 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.  
- 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).
<table>
<thead>
<tr>
<th>Programme/Initiative</th>
<th>Description</th>
<th>Collaborative grants</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAZUM</td>
<td>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.</td>
<td>X</td>
</tr>
<tr>
<td>IRECO</td>
<td>Programme that encourages SMEs to cooperate with scientific and research institutions</td>
<td>X</td>
</tr>
<tr>
<td>EUREKA</td>
<td>Program that supports the cooperation of SME with the international partners in R&amp;D activities</td>
<td>X</td>
</tr>
<tr>
<td>EUROSTARS</td>
<td>– common initiative of EK and EUREKA; precondition is cooperation in R&amp;D of minimum two counties</td>
<td>X</td>
</tr>
<tr>
<td>HAMAG-BICRO</td>
<td>provides funding to public sector through several programmes:</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- 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.</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Program TEHCRO has four program lines:</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- Technology Incubators</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- Technology and Business Centres</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- Centres of Competence</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- Research and Development Centres</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>- Technology Oriented Projects (TEST Programme) - provides government subsidies to applied research in the field of technology with the emphasis on encouraging hi tech development.</td>
<td>X</td>
</tr>
<tr>
<td>Croatia participated in the EU’s Competitiveness and Innovation Framework Programme (CIP) from 2007-2016</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Croatia has been a member of the EU COST Programme since 1992.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Croatia participates in the EU EUREKA Programme and TEMPUS Programme.</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Croatia has been a member of the EU COST Programme since 1992.
### Fiscal measures

<table>
<thead>
<tr>
<th>R&amp;D infrastructure</th>
<th>Costs related to R&amp;D infrastructure are eligible under HAMAG-BICRO programmes</th>
<th>x</th>
<th>x</th>
<th>x</th>
<th>x</th>
<th>x</th>
<th>x</th>
</tr>
</thead>
</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).

<table>
<thead>
<tr>
<th>Tax incentives for R&amp;D personnel</th>
<th>Eligible costs include salaries and reimbursements for employees directly participating in researches</th>
<th>x</th>
<th></th>
</tr>
</thead>
</table>

### Education, training and mobility

#### Tailored training courses for companies, entrepreneurs

#### Advise/consulting for start-ups, companies, entrepreneurs

- Business and Innovation Centre of Croatia (BICRO) provides advise for SMEs

<table>
<thead>
<tr>
<th>Placement schemes for students</th>
<th>x</th>
<th>x</th>
</tr>
</thead>
</table>

#### Support for R&D workers recruitments

#### Competence centres, clusters, science-technology

| x | x | x |
| **Networks and partnerships** | **parks** | **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). 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. Centre for Technology Transfer, Zagreb, supports SMEs Rudjer Innovation, provides services regarding the Intellectual Property Rights** |
| **Technology platforms and innovation networks** |  |  |
| **Foresight and common vision building** |  |  |
| **Market intelligence and other forms of information sharing** |  |  |

<p>| <strong>DEMAND SIDE FOCUS</strong> |  |  |  |  |
|  | The Strategy for Innovation encouragement of Croatia 2014-2020 | X | X | X | X | X |
|  | Act on Renewable Energy Sources and High Efficient Cogeneration (2015) | X | X | X | X | X |
|  | Draft of Smart Specialization Strategy 2015 | X | X | X | X | X |
| <strong>Performance standards, labeling, certification</strong> | <strong>EU Ecolabel</strong> | X | X | X | X | X |
| <strong>Public procurement</strong> | <strong>“Green” public procurement of goods and services</strong> |  |  |  |  |  |
|  | GPP2020 is being implemented in Croatia since 2015 |  |  |  |  |  |</p>
<table>
<thead>
<tr>
<th>Technology Transfer</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D procurement</td>
<td></td>
</tr>
<tr>
<td>Pre-commercial procurement</td>
<td></td>
</tr>
<tr>
<td>Advisory support for technology adopters</td>
<td></td>
</tr>
<tr>
<td>Financial or fiscal support for technology adopters (e.g. grants for purchasing new technology)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Support of private demand</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax incentives for consumers (e.g. for purchasing environmentally efficient products)</td>
<td></td>
</tr>
<tr>
<td>Tax reductions for products and services (e.g. VAT reductions)</td>
<td></td>
</tr>
<tr>
<td>Demand subsidies (e.g. eco-vouchers, consumer subsidies)</td>
<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>
</tr>
<tr>
<td>Awareness raising and information provision</td>
<td></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.

Visit EIO and DG ENV Eco-innovation Action Plan (EcoAP) website and register to get access to more information and to access all EIO reports, briefs and databases.

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