Pregledni znanstveni rad
Review paper

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THE ROLE OF GREEN TECHNOLOGIES IN CRISES – CROATIA CASE STUDY

ULOGA ZELENIH TEHNOLOGIJA U KRIZAMA – PRIMJER HRVATSKE

Sažetak

Kolaps bankarskog sustava, financijske krize i pad slobodne ekonomije samo je produbio probleme energije i ekologije krize. Međutim, budući da kriza stvara i nove mogućnosti, proces oporavka je također doveo do zelenog gospodarstva temeljenog na zelenim tehnologijama. Svijet rada, ljudskih potreba, prirodnih resursa i njihovih međusobnih odnosa su temelji za zelene ekonomije i tehnologije. To je pitanje kvalitete, a ne količina. To je oporavak pojedinaca, zajednica i ekosustava. Zelena ekonomija i zelena tehnologije nisu samo pitanje zaštite okoliša i energetske sigurnosti. Oni stvaraju nove horizonte izradu gospodarstvo poput jedrilice na vjetru eko-sustava, stvarajući sklad prirode i ljudskih potreba. To je odgovor na ukupne krize koji su došle u punom jeku u 2009. i traju sve do danas. U ovom radu će se opisati sustav zelenih tehnologija i zelene ekonomije u hrvatskoj studiji slučaja.
***Ključne riječi**: kriza, zeleno gospodarstvo, zelenih tehnologija, oporavak.*

Abstract

The collapse of the banking system, financial crisis and the fall of free economy only deepened the problems of energy and ecology crisis. However, since crises create also new opportunities, the process of recovery has also given rise to green economy

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based on green technologies. World of labor, human needs, natural resources and their interrelations are basic for green economy and technologies. It is the question of quality and not quantity. It is the recovery of individuals, communities and eco-systems. Green economy and green technologies are not just a question of environmental protection and energy security. They create new horizons making the economy like a sailing boat in the wind of eco-system, creating the harmony of nature and human needs. It is the answer to overall crises that went into full swing in 2009 and have lasted ever since. In this paper will be described system of green technologies and green economy in Croatia case study.
Keywords: *crisis, green economy, green technologies, recovery.*

INTRODUCTION

The definition of crisis found in the Oxford Advanced Learners Dictionary is that it is "a time of great danger, difficulty or confusion when problems must be solved or important decisions must be made" and providing a second meaning as "a time when a problem, a bad situation or an illness is at its worst point" [1]. Disaster is defined as "an unexpected event, such as a very bad accident, a flood or fire that kills a lot of people or causes a lot of damage – syn: catastrophe [1].

In the history there always been disasters, risks and crises. It can be caused by human activities or by nature [2]. Lerbinger categorized seven types of crises: natural disasters, technological crises, and confrontation crises, crises of organizational misdeeds, crises of skewed management values, crises of deception, and crises of management misconduct. Most of the crises today have been created by humans and mostly represent any unstable and dangerous social situation regarding economic, military, personal, political or societal affairs.

Crises are increasing both in number and dimensions, affecting almost everyone. Las finance crises which started in USA at 2008 opened new dimension on global market. Sustainable development and green technologies become more and more popular in the economist surrounding. A Green new deal becomes a platform for new century! That will be a time were profit should not be the only goal.

It is necessary to be averring that the time of cheap fossil fuels energy is over. In the same time we have paradox in the energy system – economy based on fissile fuel and reducing the carbon dioxide emissions on the other. It is also economically inefficient. Besides a declarative political decisions on low-carbon green economy what is really needed is re-distributions of financial support from fossil fuel subsides towards subsides for renewable energy and local production. Local production of food, eco agriculture, local renewable energy and its supporting industry are win-win option for self sufficient local communities.

What is missing than? It is not or low informed public sector, there is no public discussion and decisions based on arguments.

Environmental protection has a key role in the context of crisis management. It is not just about development of the industry of environmental protection and implementation of new ways of management in innovative solutions in solving problems. According to OECD there are about 36 environmental taxes in Croatia, among which 10 regard fuel and vehicles, 2 regard air pollution, 6 regard water, 8 regard wastes, while the remaining 10 refer to use of resources and nature protection.

In the same time the new EU energy policy aims for supporting the EU industry in the times when most of the industry and jobs have been moved or relocated to Asia. Energy sovereignty is one of the crucial issues because if the country import more than 50% energy, a country losses sovereignty, which is the case in the most of EU countries including Croatia. Projections show that by 2030 energy import may grow up to 75% [3]. A regional UNDP study on fossil fuel subsidies shows that 5-6% of GDP in Croatia goes to fossil-fuel subsides, in other countries of the region it is even more [4]. That is waste of the money but in the same time opening new possibilities for countries especially for Croatia. Those possibilities are in the sector of renewable sources of energy, were for example solar energy employs ten times more people than fossil fuel energy plant but only if we have all process and production locally. Very important is EU 20-20-20 policy which clearly defined reducing of primary energy use by 20%, reducing greenhouse gas emissions by 20% and increase share of renewable in energy to 20% by the 2020. Green economy is based on green technologies which can cover different renege of interest.

1. OBJECTIVES AND IMPORTANCE OF GREEN TECHNOLOGY

Green technology is considered to be the future of the society as a whole. Its primary objective is to find and develop such technologies which will not destroy the environment, which will reduce the use of fossil fuels, create less impact on human health, flora and fauna, and ultimately the world at large [5]. Furthermore, an important objective is to create such products which are fully recycled or reused. The aim is certainly to reduce the amount of waste generated, and therefore the pollution which occurs during the development of a product, its usage and eventually its disposal when it becomes waste. The challenge of today is no longer technological development, but rather the development of such technologies which will create harmony with the environment. Initiatives are launched to protect the environment in order to support green technologies, therefore supporting the growth and the construction of ecologically acceptable plants, use of renewable energy sources, cleaner technologies and similar [5].

The crisis has created a huge burden on the European economy, sources of funding have been reduced, energy sector and transport look for new ways to satisfy a hungry market. There is an ever stronger need for energetic independence. Pollution grows – every day and every year billions and billions of tons of various ores, mineral fuels, building materials are extracted from the earth, among others 4 billions of tons of oil and 2 billions of tons of coal. 100 million tons of fertilizer and several millions tons of pesticides and herbicides are put on arable land. Over 200 million tons of carbon

dioxide, 50 million tons of nitrogen oxide, 50 million tons of hydrocarbons, 150 million tons of sulphur dioxide and 250 millions of tons of dust are discharged into the atmosphere. Approximately 32 billions of tons of cubic meters of waste water and up to 10 millions of tons of oil are discharged into rivers, lakes, seas and oceans [6].

Green economy does not put in focus financial gain over man and nature anymore. It opens a new approach to thinking, projects and economic factors in general. At the same time, it is not just a question of the environment and environmentally acceptable technologies. It leads us to the harmonization of nature and man. Those are different technologies; they require great human creativity, actual knowledge and involvement of all of us into this extensive process. Man in the true sense of the word becomes a worker and participant in the creation of the product, aware that the product which is being created is produced from natural raw materials and as such will be returned to nature [7].

Achievement of harmony with nature requires the economists and experts to define new rules and principles.

2.1. Basic concepts and principles of green economy

There are several basic principles that define green economy. Primarily it is quality, real value and usability related to the meeting of man's real needs where money becomes the means for the easier provision of changes [5, 7]. The importance of following natural flows relating primarily to renewable energy sources and the principle of circulation of substances in nature. Possibility of creating waste which will be equal to food by its properties, what will ensure that the waste created is not toxic and can be used in some of technological processes. Multifunctionality is very important, which will ensure the creation of an economy with an additional vision. Appropriateness which creates balance with regard to the impacts does not mean that less is necessarily the best. It is awareness of the impacts, the way in which small activities can sometimes have great impacts. Biodiversity depends on diversity and continuous flow of substances, people and other living creatures. Self-organization which already exists in nature clearly defined through various forms of hierarchies. Based on such systems, an economy is built that mimics the behavior within ecosystems [6]. Creativity and development lead to the spontaneous process of creativity in the system of technological development.

2. GREEN TECHNOLOGIES AND GREEN ECONOMY – THREE PILLAR MODEL

In 1992 Rio earth summit popularized three pillar models which show connection with social, economical and environmental parts of the modern society. The people in the western world are heavy consumers. In fact, they consume far more than our fair share. Meanwhile, the people in developing countries are exploding in population and some are aspiring to have high-consumption lifestyles too. It is necessary to have a sustainable

economic model that ensures fair distribution and efficient allocation of our resources. Economic pillar ensures that economic growth maintains a healthy balance with our ecosystem. Regarding the environment it is obvious that we take our natural resources for granted and sometimes we forget that those resources are not unlimited. Environment pillar supports initiatives like: renewable energy, reducing fossil fuel consumption and emissions, sustainable agriculture and fishing, organic farming, tree planting and reducing deforestation, recycling, and better waste management. Social pillar recognize a global citizen which never turn a blind eye to social disruptions that threaten the well-being of people and our environment. It is meter of ethical responsibility to do something about human inequality, social injustice, and poverty. This pillar supports initiatives like peace, social justice, reducing poverty, and other grassroots movements that promote social equity. All those three pillars are connected and can represent two ways: inclusive growth and green growth (Figure 1).

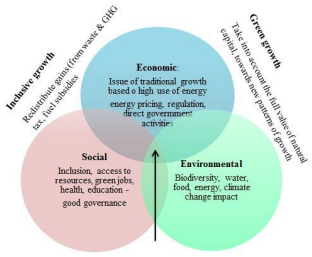
The question is how to represent green growth? Is these economic and environmental pillars or all three pillars?

Despite the sustainable development strategies at the central level and various regional development strategies at local level the lack of necessary knowledge about sustainable development is disturbing all over the EU countries including Croatia [8]. Developing countries are suspicions of the green economy because it may leave out the social pillar [9].

Green economy development can be achieved true:

- renewable energy sources
- energy efficiency
- cleaner production
- recycling technologies
- green building
- green tourism
- eco agriculture
- green services
- eco innovations and etc.

Figure 1. Three pillar model of sustainable development [9]



3. CROATIA SITUATION

Croatia recognizes need for going green but situation is not promising. In Croatia mostly companies that are a part of the Croatian business council for sustainable development promote the concept of sustainable development, through corporate responsibility but it is a small minority among Croatian businesses.

In the same time The Croatian government is actively working to reduce emissions while the Croatian Parliament has been proactive in adopting laws in the sector of energy and environment. It is adopted several sector-specific strategies and action plans [4]:

1) The national waste management strategy identifies the problems and obstacles and establishes the framework for waste reduction and sustainable waste management. The strategy is being implemented through a national waste management implementation plan 2007-2015.
2) The water management strategy is a fundamental national long-term strategic water management document, establishing a unified water management policy and an integral and coordinated approach to improving the water system in line with international commitments.
3) The air quality protection and improvement plan for 2008-2011 is an enforcement document which sets up fundamental objectives of air quality protection/improvement and long-term measures for their accomplishment.
4) The strategy and action plan for the protection of biological and landscape diversity for 2008-2018 focuses on conservation of biological and landscape diversity, harmonization of legislation with the relevant EU directives and regulations, meeting the obligations resulting from the international agreements, etc.
5) The energy strategy has a purpose to define the development of Croatian energy sector by 2020 while acknowledging accession process and adoption of the *EU Acquis* thus ultimately building sustainable energy.
6) The national forest policy and strategy aims at increasing the contribution to the national economy by sustainable management, use and comprehensive protection of forest resources and biodiversity.
7) The strategy for the development of industrial processing of wood and paper recognizes that the ecosystem management should become one of the priority activities for each branch of this sector.
8) The main purpose of the strategy for agriculture and fisheries is to determine the dynamics of the realization of the objectives defined by the law on agriculture. A few of those objectives refer to sustainable management and efficient use of national resources.

Croatians are concerned about climate changes [10] but in spite of the growing awareness of the significance of climate change and climate energy policies as well as

environment problems and the existence of a number of strategic documents there still not enough knowledge or application of the concept of sustainable development in the design and implementation of economic and social development policy [11].

4. WHAT IS THE MAIN GOAL FOR CROATIA AND HOW TO ACHIEVE?

The main reasons for going green in Croatia are: big number of unemployed (355.5980 in April 2013) showed on figure 3. and 4. high share of imported energy (over 50 %), need for emission reduction (Kyoto protocol), and minimal share of energy from renewable sources in current energy production [12]. In Croatia quarterly rate of GDP is in constant down (Figure 2.)

Achieving these three targets is possible true number of new created jobs, reduction of greenhouse gases, total investment values and annual energy production or reduction. In the same time it is important that Croatia focus on technologies that can be produced domestically, on smaller systems that can help in diversifying energy sources, on rural development (diversification of rural economy) and on cleaner technologies with smaller impact on environment [13].

Figure 2. Quarterly rate of GDP [12]

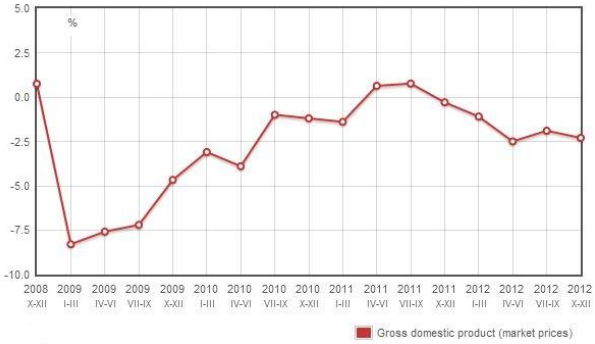


Figure 3. Registered unemployment rate (for total employment) [12]

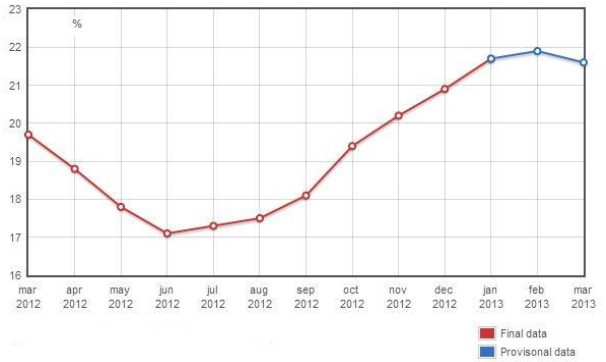
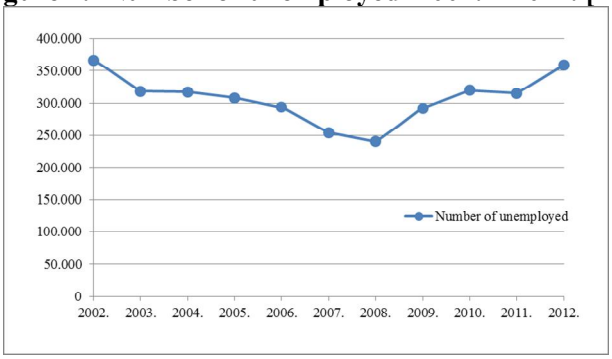


Figure 4. Number of unemployed 2002. – 2012. [12]



According UNDP report for Croatia very important is energy sector which can open lots of possibilities for creating green jobs like [4]:

- Establishment of micro-crediting line in commercial banks for building energy efficient houses, applying efficiency measures in existing buildings, installation of solar-thermal systems and biomass heating systems.
- Incentives for installation of solar-thermal systems and biomass furnaces in all counties.
- Re-direct the announced funding for stimulation of buying the first apartment towards stimulating energy efficiency in building sector.
- Establishment of guarantied tariff for producing heat from renewable energy sources.
- Obligation for minimal heat energy share from renewable sources in new buildings.
- Prequalification and additional education for working positions in the sector of renewable energy sources (special focus on unemployed, employed in shipyard industry, war veterans, and rural areas).
- Incentives for companies that produce technologies and services in the sector of renewable energy sources and energy efficiency (attractive crediting, tax exemption…) and etc.

Calculating the goals set until 2020 in the sector of energy efficiency buildings it is possible to achieve 7.000 direct and 7.000 indirect and induced green jobs, in the sector of biomass utilization it is 5.000 direct and 55.000 indirect and induced green jobs, solar systems 1.300 and 2.000 indirect and induced green jobs, wind energy 1.200 direct and 1.000 indirect and induced which can be in total 14.500 direct jobs and 65.000 indirect and induced jobs. This will reduce annually 21% of today CO_2 emissions.

CONCLUSION

Green economy leads to the recovery of a man as an individual and the community, as well as the ecosystem. Built on the basis of green technologies, it does not

simply pose the question of environmental protection, but also opens new horizons, making the economy a sailboat on the wind of ecosystems and creating a harmony of nature and human needs. Stimulation of green economy is in accordance with the aims of cohesion policy for the achievement of sustainable development, which ensures the leading position of Europe in the field of green technologies. Continuous care about the environment, increase in energetic efficiency and the use of renewable energy sources are one of the basic components of sustainable development, and when it comes to the Republic of Croatia also an important factor for the young EU member. New investments in energy facilities are motivated by the desire for an energy independent state, high demand for electric energy and the necessity of adapting Croatia to EU guidelines. Commitments under the third energy package are also an important factor and an initiator of the development of green technologies. Universal policy of green economy based on green technologies is certainly the future of Croatia, Europe and the world. Man's return to nature, creation of technologies that do not pollute the environment will not only save the planet, but will also create a new way of thinking in the money market. It will become a real world of interwoven human needs, labor and nature in which there is no accumulation of money or things, but rather a renewal of individuals, communities and ecosystem. It is one way of overcoming the crisis.

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