Krstinic Nizic, Marinela, and Suzana Baresa. 2013. The role of cities in protecting environmental quality. *UTMS Journal of Economics* 4 (3): 325–339.

Preliminary communication
(accepted Juny 10, 2013)

THE ROLE OF CITIES IN PROTECTING ENVIRONMENTAL QUALITY

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Abstract:
In addition to being characterised by the rapid population growth, the cities have long represented the centres of knowledge and the sources of growth and innovation, with unique cultural and architectural features, offering exceptional capacity for economic development. The cities are linked to the perception of urban lifestyle and are conventional areas of economic activity and trade. The modern cities' structures are affected by technical, technological and industrial changes, the improvements in the fields of service and transport, as well as the strong progress in the fields of all forms of communication. Parallel to this, more and more of the population is concentrated in the suburbs, forming concentrations of poverty, work zones or elite residential areas. Furthermore, the cities are increasingly faced with a variety of demographic problems, social inequality, social exclusion of certain population groups, the lack of adequate housing, and particularly the problems associated with the environment, i.e. the main goal of this paper. Each community needs to ensure the basic requirements such as peace, education, safe housing, stability of the ecosystem and social justice. In other words, since health is an important factor determining the quality of life, various economic, political, cultural, and social factors affect its actualisation both positively and negatively. Therefore, the basic aim of this paper is demonstrating that cities can resist pollution and improve environmental quality, and thus, using economic instruments, improve the health of their citizens.

Keywords: economic instruments, environmental health, socio-economic context, green growth.

Jel Classification: Q53, Q56

INTRODUCTION

We live in a world dominated by urbanism, with the majority of the global population living in the cities. With the current trends in urban population growth, by 2030, the proportion of urban population will increase to 60 per cent of the global population. At this point, it is an unstoppable trend, and cities are being increasingly recognised as both a problem and a solution to sustainable development in the world. The problem lies in overcrowded cities, transport designed for cars, poor air quality, under-developed drinking water supply infrastructure, unsatisfactory sanitary conditions,

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waste disposal and various social problems stemming from poor housing conditions. All the above-mentioned problems affect the inhabitants' health. Furthermore, cities consume tremendous amounts of energy, due to energy-inefficient residential and commercial buildings, poorly designed transportation system, dependence on imported foods from remote areas, and dependence on imports in general. Although cities occupy just 2 percent of the Earth's surface, their inhabitants use 75% of the planet's natural resources (McKinsey Global Institute 2009). The cities spend 60-80% of global energy production. It is predicted that, by 2050, urban population will exceed 5 billion. The striving for human well-being has made the existing resources growingly endangered. An important indicator of the existing resources' vulnerability and the sustainable development of urban ecosystems is the ecological footprint. In sustainable urban planning, current ecological footprint accounting methodology has not yet been efficient enough. The essence of sustainable urban development lies in the balance between human needs and urban living environment potentials, since a city cannot simply be seen as a sum of different parts, but rather as a complex system of interrelated functions that aim to establish and/ or maintain balance in the urban environment – the urban ecosystem. The urban ecosystem represents a complex, open dynamic system with its own structure and dynamic functional flows that aim to establish the balance between the need for natural resources and the existing capacity of the environment. The urban system structure consists of clearly defined boundaries, elements, natural resources and urban infrastructure networks. Urban institutional and ecological footprint represents a more complete, comprehensive approach to sustainable urban planning that will provide healthier lives for the residents.

At the political level, cities are credible laboratories of social change with sufficient scale to bring about meaningful actions. At the economic level, the world's 50 largest cities alone have a combined gross domestic product (GDP) of $9.6 trillion, more than all of China, and second only to the entire U.S. economy (World Bank 2010). The cities' benefits hide in quantities, i.e. in the large number of people living in one place. Due to high urban population density, the cities are, both financially and in terms of energy efficiency, the most cost-effective areas for investment in sustainable solutions in transportation, heating, energy production, organic food and recycling. Urban population density could become the answer to the unsustainable situation in the cities. As much as the cities in the developing countries will struggle to move towards sustainable development due to uncontrolled population growth and poor management and infrastructure; so will the cities in the economically developed countries encounter problems due to excessive dependence on the input of large amounts of energy in the less densely populated areas. Cities have become the centers of economic, cultural and political power of the developed world, that are, at the same time, unsustainable centers that use the environment and resources and impact climate change.

In studying the problem of urban pollution, it is important to emphasize the concept of cities as ecosystems, i.e. a set of interconnected organic and inorganic components that, at the same time, form its subsystems. Its main characteristics are high population density and production that affect the destruction or modification of certain natural subsystems; spending large amounts of energy; consuming large amounts of food shipped from natural subsystems, modified and returned to nature, and polluting the environment creating large amounts of waste. Therefore, the purpose of this paper is to show that cities have the opportunity and the tools to resist these problems in order to

improve not only the quality of air in the cities, but also the quality of life in general, ultimately improving the citizens' health. At the first meeting of the World Health Assembly on 24 July 1948, health was recognised as an important factor in creating a better and happier life, and a fundamental human right that each community must provide for its citizens. Today, theorists of public health increasingly link the concepts of health and healthy communities and societies with of one of the most important determinants of health, social cohesion. Thus Lomas (1998) points out that the way we organise our society and the degrees to which we encourage interaction between citizens, to which we trust each other, and to which we connect within the local communities, are probably the most important determinants of health. On the other hand, Rothman and Brown (1996) emphasize the importance of the degree to which effective community action is encouraged in order to solve the problems of health and improve the conditions that lead to its achievement. Even though different authors' interpretations of the crucial determinants of health disagree in giving priority to either social, psychological, physical or economic elements, the fact remains that no one denies the importance of any of these factors.

The study was conducted using the collection and analysis of data, information from secondary resources, scientific methods of deduction, desk-method of research, descriptive and comparison methods. As the result of the research, the author accentuates the measures to mitigate the causes of climate change in a way that improves the environmental quality, and consequently the citizens' health.

The study consists of an introduction followed by three chapters. The first chapter points to the importance of the healthy city project in accordance with the Ottawa Charter for Health Promotion. In the second chapter, the problems caused by air pollution in major cities and world capitals are analysed. The third and key part of the paper presents the economic instruments for addressing pollution and the potential benefits of tax on CO2 emissions, and proposes and analyses the measures to mitigate the causes of climate change in order to improve the citizens' health and reduce costs.

Finally, the authors try to offer some possible guidelines for reducing the negative effects occurring in urban development areas, and for ensuring sustainable and responsible development of the cities in the future.

1. HEALTHY CITIES PROJECT

The Healthy Cities project represents a movement established by the WHO (World Health Organization) European Region. It covers the long-term international development project started in 1986, with the main goal of positioning health in the peak of political activities within major European cities and of promoting local health and sustainable development strategies by enabling the co-operation of the cities without political barriers. They are mainly concerned with cities, but also with other settlements people live and work in. The Healthy Cities project is based on the strategy of "Health for All", with its principles translated into practice by local policies on city levels. "Health for All" is a document sent to the international community and its members by the 1977 WHO Assembly as a global strategy, and that started a re-examining of the existing health policy foundations throughout the world. The document consisted of recommendations aiming at protecting and improving health of

all nations of the world, stressing the need for orientation towards the primary health care protection.

There are three important strategic principles on which healthy cities are focused (Potvin and Jones 2011):

1. multi-sector approach, the health being not only the question of health system, but of all related and developing systems within society;
2. active citizen participation – self-help, mutual help, possibility of deciding on health, etc.;
3. care for environmental health (biological, physical, and social environment) – the right and responsibility of every citizen to live in aesthetically and ecologically high-quality surroundings.

However, "Health for All" was only a general vision on health improvement, insufficiently developed both on international and European levels. Therefore, the First International Conference on Health Promotion held in Ottawa, Canada, on November 21st 1986, defined the concept of health improvement and accentuated the prerequisites for its achievement, after which the strategic action framework was accepted in the form of the Charter for action to achieve Health for All (Poland, Dooris, and Haluza-Delay 2011).

In order to enable health improvement, every particular social environment must ensure some basic prerequisites, such as: peace, education, stable living conditions, income stability, stable eco-system, social justice, equity. In other words, health is seen as an important dimension of the quality of life (Cfr. Avelini Holjevac 2001) and, accordingly, various economic, political, cultural, social or other factors can all favour health or be harmful to it. Therefore, the basic goal in health promotion action makes these conditions favourable through an advocacy for health.

According to the Ottawa Charter the following steps in health promotion should be undertaken (Kregar 2001):

- promotion of public health policy
- creation of supportive environment
- strengthening of community actions
- development of personal skills
- re-orientation of health-care services.

The Ottawa Charter did not only define health promoting concept, but also created the overall vision of the movement to which a number of letter documents would be added. Furthermore, the Ottawa meeting accentuated that health improvement strategies and programmes should be adapted to the local needs and possibilities of individual countries, which inspired the creation of the document called "Health for All in the 21st Century". "Health for All in the 21st Century" represents the strategic document defining the framework for formulating the health policy of European countries by the 21st century. Two leading goals of the "Health 21" strategy (based within the framework of the previously stated document) are the following:

- to improve and preserve health throughout the whole human life
- to decrease the incidence of leading diseases and injuries of the present age and remove the pain caused by them.

The needs of the overall European region and the actions necessary in health improvement are laid out in 21 health principles which also represent the values

according to which the improvement in health promotion and preservation and reduction of risks are measured.

Therefore the Healthy City project affirms the holistic nature of health in order to reach a state of its complete physical, mental, social, and spiritual dimension, which results in acceptance of the diversity of factors with their direct or indirect impact on health disturbance within a community: noise, stress, social security system, living conditions, public services, educational system, environmental condition, etc. Such health approach is surpassing the health sector engagement alone and demands action both by non-sector organizations and individuals in activities connected to health improvement, with the final goal of involving the whole community.

The Healthy City successfulness can be measured by the health policy acceptability on the city level, but it can be fitted into a tourism destination as well. Homes, working places, schools, streets, as well as hotel settlements, camps, tourist apartments – which all form part of urban surroundings – must become healthy living places both for citizens and tourists.

In addition to the already mentioned documents, a contribution to growth and development of the Project in general, and to growth and development of local projects was made by a number of international documents[2], while the number of either project cities or those linked to national networks is growing continually.

Croatia entered the project in 1987, when Zagreb became a project city of the WHO European Regional Office "Healthy Cities" project, and thereby overtook the obligation of forming the Healthy Cities Network on the former Yugoslavian territory. Croatian cities and counties – Network members – were therefore enabled to co-operate and link up with other European project cities, with other national Networks (NETWORK – European network of healthy cities national networks) and with the WHO European Office. Croatian Network's mission was namely to support Network members (cities/counties) in their aspirations to install and lead respectable Healthy City/Healthy County projects, projects which would be able to impact and help any community/city/county within the country in building local or national social health policies (Kickbusch and Gleicher 2012). Their goal is to enlarge the Network by including every community/city/county into the project, and to operate together in recognizing health values and qualities, until health becomes recognized as the developing potential of the country. The negative health effects of pollution are becoming an increasingly important topic in the research. Assessing the health effects of environmental factors, the research suggests various models and identifies the most critical elements (Sun et al. 2013). Since public awareness of the consequences of environmental pollution is constantly growing, further research within this area of interest is essential.

[2] Adelaide Declaration (within which the concept of public health policy was worked out), Social Charter (accepted in 1989 in Strasbourg), European Charter on Environment and Health from 1990, Agenda for the 21st century (representing the plan of global partnership aiming at reconciling the dual demand: for high-quality environment and for healthy economy of all nations of the world), Aalborg Charter of European Cities and Towns Towards Sustainability (representing European coalition in achieving sustainability), Jakarta Declaration (including priorities in health promotion for the 21st century), and Athens Declaration (expressing key principles for health improvement: equity, sustainability, intersectoral cooperation and solidarity, and accentuating commitment of enforcing programs agreed upon within the framework of global or regional policies on the local level).

2. URBAN AIR POLLUTION

Today, cities have a growing significance, holding the majority of the world's population. The world's urban population records exceptional growth, which may be expected to continue in the upcoming decades. It is estimated that the world's urban population will reach over 3.2 billion inhabitants by the year 2050. On the other hand, the world's rural population and the rural population of the OECD will start to decline after 2020, while the urban population of the OECD will continue to grow (Kamal-Chaoui and Robert, eds. 2009). In addition to being characterised by the rapid population growth, the cities have long represented the centres of knowledge and the sources of growth and innovation, with unique cultural and architectural features, offering exceptional capacity for economic development. The cities are linked to the perception of urban lifestyle and are conventional areas of economic activity and trade. The modern cities' structures are affected by technical, technological and industrial changes, the improvements in the fields of service and transport, as well as the strong progress in the fields of all forms of communication. Parallel to this, more and more of the population is concentrated in the suburbs, forming concentrations of poverty, work zones or elite residential areas. Furthermore, the cities are increasingly faced with a variety of demographic problems, social inequality, social exclusion of certain population groups, the lack of adequate housing, and particularly the problems associated with the environment, i.e. the main theme of this work.

In order to better represent the growing pollution problems in the world, this work uses the EEA data on concentrations of O_3 (ozone); NO_2 (reactive pollutant generated by oxidation of nitrogen released into the atmosphere through the process of high-temperature combustion, representing the key component in the creation of secondary toxic contaminants such as nitric acid and photo-oxidants, including ozone, and increasing the effect of other pollutants and allergens in the atmosphere, with close relation to the motor vehicles exhaust emissions, and PM_{10} (atmospheric particulate matter formed as a mixture of organic and inorganic substances which mostly originate from power plants, and as a product of the combustion of diesel fuels, created in the atmosphere through a transformation of emission gases).

Thus, in the period 1997–2006, 18–52% of the urban population was potentially exposed to NO_2 concentrations above the EU limit value; 18–50% to PM_{10} concentrations above the limit value, and 14–61% to ozone concentrations above the limit value. Many areas, including northern Italy, Spain, Portugal, the Czech Republic, Poland, Hungary, Romania, Bulgaria, Benelux, Greece and the western Balkans, were exposed to daily concentrations of PM_{10} particles greater than 50 g/m3 for more than the allowed 35 days/year, which increases the number of diseases of the respiratory and the cardiovascular systems, especially in children and the elderly. Furthermore, a strong relationship between heavy traffic and the impact on health was established, with the number of premature deaths due to the anthropogenic $PM_{2.5}$ emissions from traffic and other sources estimated at 350,000 people a year.

It has become evident that air quality and pollution are closely connected to health. These reasons led to the introduction of Integrated Environmental Health Monitoring (IEHM), an essential tool to better understand complex environmental health issues. The reserachers (Liu et al. 2012) analysed the frameworks and monitoring programmes in the area of environmental health, and came to the conclusion that most programmes

wrer designed for specific purposes, resulting in a narrow scope and a limited number of parameters. Other drawbacks of studying complex environmental health topics include limited spatial resources, data availability, limited development of data sharing, heterogeneous data quality, lack of appropriate methodologies linking different data sources, low level of interdisciplinary cooperation, etc. The following examples relate to measuring air quality, which also has a formidable impact on human health.

Air quality and the level of air pollution are measured by the concentration of health damaging particulate matters (PM) (sulphate, nitrate, elemental carbon, organic carbon matter, sodium and ammonium ions) in the air. The OECD focuses on liquid and solid particles less than 2.5 microns in diameter ($PM_{2.5}$), since these are small enough to enter the bloodstream through the deepest parts of the lugs. The following table (Table1) shows the average levels of $PM_{2.5}$ in the ten largest OECD metropolitan areas.

Table 1. Air pollution ($PM_{2.5}$) in the ten largest OECD metropolitan areas

Rank	Country	Metropolitan area	Population weighted average of $PM_{2.5}$ concentration ($\mu g/m^3$)
1	Japan	Tokyo	22.35
2	Korea	Seoul	27.10
3	Mexico	Mexico City	25.75
4	Japan	Osaka	21.16
5	United States	New York	19.28
6	United States	Los Angeles	13.51
7	France	Paris	18.23
8	United Kingdom	London	19.67
9	United States	Chicago	16.38
10	United States	San Francisco	8.13

Source: Hammer et al. 2011.

In order to solve the pollution problems, it is necessary to use the indicators that can measure economic growth in the cities. The OECD choice of indicators describing the socio-economic context and characteristics of growth (such as economic growth, labour markets, productivity, natural assets, environmental quality of life, economic opportunities etc.) is based on the existing work in various international organisations and countries. The complexity and multidimensionality of green growth requires a sufficient number of indicators in order to accurately measure its various aspects. Table 2 below shows a choice of about twenty indicators, selected due to their policy relevance, analytical soundness and measurability.

Table 2. Overview of proposed OECD green growth indicators

Main indicator groups	Topics covered
The socio-economic context and characteristics of growth	
Economic growth, productivity and competitiveness	Economic growth and structure
	Productivity and trade
	Inflation and commodity prices
Labour markets, education and income	Labour markets (employment/unemployment)
	Socio-demographic patterns
	Income and education

Table 2. (*continued*)

Main indicator groups	Topics covered
Environmental and resource productivity	
Carbon and energy productivity	CO_2 productivity(demand-based, production-based)
	Energy productivity
Resource productivity	Material productivity (demand-based, production-based)
	Non-energy materials, waste materials, nutrients
	Water productivity
Multi-factor productivity	Multi-factor productivity including environmental services
Natural asset base	
Renewable stocks	Freshwater resources
	Forest resources
	Fish resources
Non-renewable stocks	Mineral resources
Biodiversity and ecosystems	Land resources
	Soil resources
	Wildlife resources
Environmental quality of life	
Environmental health and risks	Environmentally induced health problems and related costs
	Exposure to natural or industrial risks and related economic losses
Environmental services and amenities	Access to sewage treatment and drinking water
Economic opportunities and policy responses	
Technology and innovation	R&D of importance to GG
	Patents of importance to GG
	Environment related innovation
Environmental goods and services	Production of environmental goods and services
International financial flows	International financial flows of importance to GG
Prices and transfers	Environmentally related taxation
	Energy pricing
	Water pricing and cost recovery
Training and skill development	Indicators to be developed
Regulations and management approaches	

Source: Hammer et al. 2011.

If the cities take into account the indicators proposed in the table, they will undoubtedly reduce pollution and thus improve both the quality of life and the citizens' health.

3. ECONOMIC INSTRUMENTS FOR SOLVING THE PROBLEM OF URBAN POLLUTION

Economic instruments are various instruments (such as charges and taxes) used to pass the costs of waste management and the environmental impacts of waste on to consumers, i.e. to internalise the costs of waste disposal and recycling. The instruments most commonly used in waste management are charges for the household waste collection and taxes on tipping (illegal dumping) or incineration.

Economic instruments such as taxation and emissions trading are increasingly popular, since they provide an incentive to the market and thus prove to be more cost-effective than regulation. In the OECD countries, there are approximately 375 environmentally-related taxes, in addition to about 250 environmentally related fees and charges (the OECD and the European Environment Agency database). Most of these relate to the energy and transportation sectors, providing about 90% of the tax revenues from taxes on motor vehicle fuels and motor vehicles (Hammer et al. 2011). Some Asian countries (China, South Korea) introduced, providing economic incentives for achieving reductions in the emissions of sulphur dioxide, nitrogen oxides and particulate matter. Successful emissions trading systems depend on a formal legal structure that includes an effective compliance system with real consequences for non-compliance. However, at the local level, more research is needed in order to devise and implement effective emissions trading systems.

Economic instruments, as defined by Theodore Panayotou (1995), relate to the promotion of behavioural changes of business subjects through an internalization of environmental costs or the cost of the depletion of natural resources by changing the incentive systems that these entities are exposed to (Simunovic 2007, 179). Their main purpose is to affect the relative price and performance, contribute to the realization of justice and the internalisation of external costs, thus including the costs of pollution into the price of the product, and aligning public and private costs. Pollution charges ultimately reduce pollution, proving these instruments to be the most effective of the above-mentioned.

There are nine types of economic instruments (Simunovic 2007, 179):

- emission fees, charges and taxes;
- user fees, such as paying for public service (waste management);
- product charges on those products whose production generates pollution;
- non-compliance fees for those who do not respect the conditions and regulations of the environmental management;
- deposit-refund systems, or a surcharge on a product when purchased and a rebate when it is returned;
- tradeable permits, allowances or quotas (the sources of the emission to be regulated are given permits to release a specified number of tons of the pollutant)
- performance bonds, where payments are made before a potentially environmentally damaging activity is undertaken, and which are returned only if the damage does not occur;
- compensations for environmental damages, the amount to be paid for the environmental damage by the party whose activities are likely to have caused the damage concerned;
- Subsidies (incentives) or forms of financial aid to the polluters.

The potential benefits of tax on carbon dioxide emissions, its impact on the revenue and the emission itself, can be seen in the following figure 1 (Morris 2013).

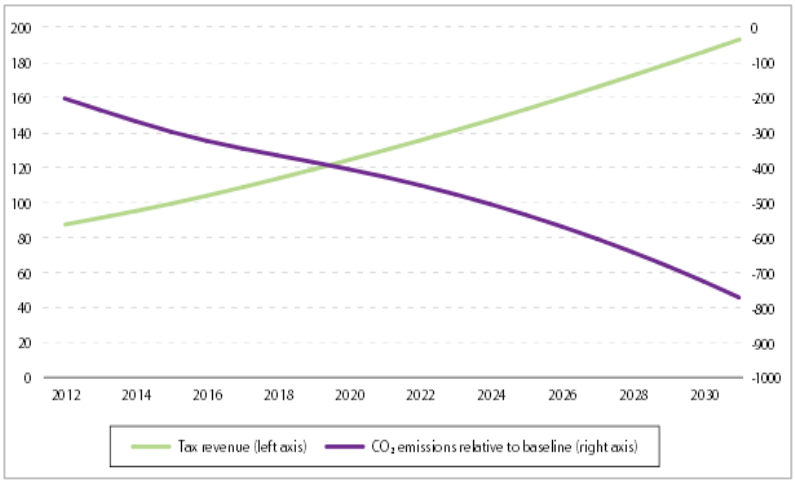

Figure 1. The effects of carbon tax

As shown in the graph, the tax on carbon dioxide emissions is expected to significantly increase the revenues, but also to reduce the emissions, which would allow the cities a much more successful fight against climate change. Increased revenues would enable the development of investments and the welfare of the inhabitants, while the tax application itself would provide incentives for the use of clean energy sources and energy efficiency promotion. According to various researches conducted in the U.S., its application would further reduce the state budget deficit by nearly $ 200 billion in the following decade, and by more than 815 billion dollars in the next two decades.

The benefits of this group of economic instruments are reflected in the reduction of air pollution, microbiological contamination of water supplies, infrastructural improvement of drainage, water supply and water purification systems in the area, as well as in the progress associated with acid rains, biodiversity and climate change. However, there are some possible problems in applying the economic instruments such as: the impossibility of their application due to a lack of spatial plans, since there are no solid assessments of what is and what is not allowed in the exploitation of natural resources; and the fact that many countries do not want to divide the taxes between the environment and the state budget, have no legal basis for the design of economic instruments, or face high barriers to their application since their laws are not codified. All of these reasons make permanent monitoring and analysis of economic instruments, and especially their alignment with the needs of the environment, of crucial importance.

On the other hand, cities with proper planning and managerial structures can become centres of innovation and efficiency that, together with the local authorities, have the ability to reduce the causes of climate change and effectively protect themselves from their influence, and to become sustainable cities, providing high quality life for their residents.

The measures for mitigating climate change causes can be divided into four categories: the improvement of public health; cost saving and increased efficiency:

improvements in infrastructure and energy security; and improvements in the quality of life. Some of the benefits are shown in the following table.

Table 3. Related aims and co-benefits of sector policies to reduce GHGs at urban scale

Sector	Climate policy aims and benefits	Other (non-climate change) benefits
Electricity production and industrial energy use	Encourage fuel switching from coal and oil to low or no-emission energy sources, such as combined heat and power, renewable energy and energy efficiency, to reduce CO_2 emissions	Rises urban air quality and limits regional SO_x and NO_x air pollution, preserve water quality, increase energy security, all of which can deliver local benefits
Residential& commercial energy: buildings, office equipment& appliances	Lower energy use requirements of housing and household services, reduce CO_2 emissions	Lower investment costs for energy suppliers and possibly smooth load; lower operating costs for commercial entities& consumers and avoids regional air pollution from (unnecessary) electricity and/or heat generation; improve comfort and affordability; raise energy security
Transport	Raise the efficiency and emission performance of vehicles and manage demand, reduce CO_2 and possibly other GHG emissions	Lower congestion in cities and limit harm to human health from urban air pollution; lower dependency on oil imports to raise energy security. However co-costs may also exist *e.g.* Increased diesel fuel use lowers CO_2 but increases particulates, which have human health risks; also catalytic converters lower NO_x emissions but raise N_2O and CO_2 emissions
Waste	Minimise waste, increase recycling and material efficiency in production and packaging, reduce CH_4 emissions	Limit needs for costly and unsightly landfilling; improve economic performance

Source: Kamal-Chaoui and Robert, eds. 2009.

The measures listed in the table not only contribute to the mitigation of climate change impacts through a reduction of CO_2, CH_4 and other greenhouse gas emissions, but also bring benefits to households through a positive impact on health, reduction of air pollution, improvement of air and water quality and, increasing energy efficiency, exert a positive influence on the national income. The synergy between the policies to reduce greenhouse gas emissions and the adaptation to the expected impacts of climate change is particularly pronounced in urban areas, since the efforts to reduce the cooling energy demand in buildings can help reduce the urban heat islands and avoid power outages during extremely high temperatures.

In addition to the above-mentioned measures, various adaptation measures are used, including:

- engineering techniques, such as barriers that prevent flooding;
- planning new urban development outside the coastal and river flood plains or, where this is not possible, using adaptive forms such as floating houses;

- the use of passive or highly efficient ventilation and cooling systems in public areas and buildings;
- keeping water use within sustainable limits using water management plans;
- greening the cities with parks, green walls and roofs, which provide cooling and ventilation, as well as water storage and percolation (European Environment Agency 2011)
- various local economic development strategies, which include improving the interventions related to public health, and urban agriculture that takes climate change into account.

However, in order to enable the cities more susceptible to drought or heavy rainfall to increase their water storage capacity through cooperation with the surrounding areas, it is necessary to connect the initiatives at the city level with the regional, national and European levels. Some cities have already developed plans and strategies for dealing with climate change, such as London (the Draft Climate Change Adaptation Strategy for London), which proposes actions to increase the quality and quantity of green space and vegetation in London to cool the city in the summers, reduce the risk of flooding, encourage the citizens to use less water and to raise public awareness; and Copenhagen (the Copenhagen Climate Plan), announcing an adjustment that will create a synergy of all the initiatives relating to the environment, and enhance the recreational capabilities of the city.

A good example of the benefits that can be achieved through the implementation of climate change policies can be found in the OECD assessment of CO_2 emissions with and without climate change policies application, in the period 2005-2050, as shown in the following figure 2 (Kamal-Chaoui and Robert, eds. 2009).

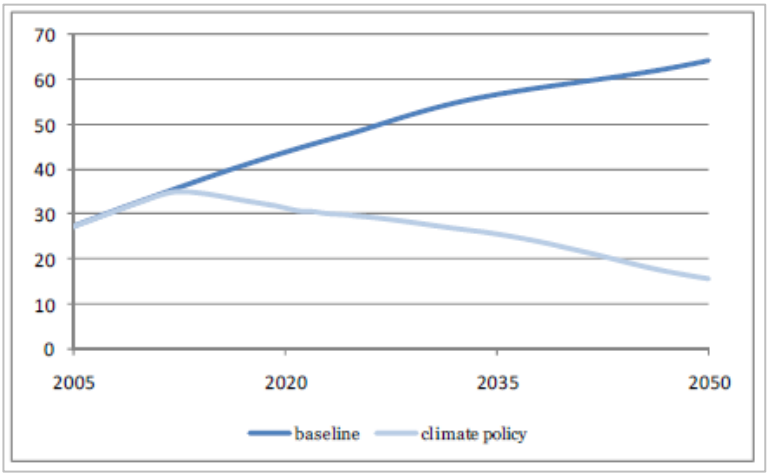

Figure 2. Carbon dioxide emission at the world level 2005-2050

The chart shows a noticeable decrease of carbon dioxide emissions, expected to begin as soon as 2010, when applying climate policies, and a progressive emission growth when such policies are not implemented.

Given all the above-mentioned, in order for the cities to successfully deal with the climate change, it is necessary to provide green areas within the city, allowing the residents to stay in the city centre instead of moving to the suburbs, while green roofs and walls provide insulation from both heat and cold, saving energy and reducing the cities' ecological footprint, and help retain the cold and fresh air in the cities, which is particularly important given the increasing heat waves expected in the future. Furthermore, the plant roots in the ground also allow the rainwater to penetrate into the soil and thus prevent urban flooding.

Urban sustainability in terms of transport, which frees up more public space, makes the cities cleaner and quieter, more resource-efficient and which reduces the level of carbon dioxide emissions, ultimately minimising the risk of floods and droughts, improves urban air quality and has positive impact on the residents' health. Given the predictions that the cities should become highly energy-efficient by the year 2050, it is expected that the lower demand for energy, including heating, cooling and electricity, should be satisfied using mainly local and regional renewable energy sources. These new buildings would not use fossil fuels, and most would produce electricity and provide parking spaces for bicycles and other means of transportation. Thanks to energy efficiency, the green economy predicts a 40% lower global energy demand until 2050, compared to the usual scenario. All of these reasons resulted in the use of the term "ecocities" which sometimes overlaps with notions of "sustainable cities" and "smart cities" (Alusi et al. 2011, 20). Ecocities represent areas which should be operated through a cooperation of urban planners, sociologists, economists, politicians and other experts. The aim of such cities is to allow people to live in harmony with nature, thus essentially ensuring good health and high quality of life.

CONCLUSION

Environmental pollution and climate change, causing sea level rising, heavy rainfalls, floods, more frequent and stronger cyclones and periods of extreme heat and cold, affect the cities and reduce the urban quality of life, threatening the citizens' health as their fundamental human right. On the other hand, cities affect climate change through energy production, industry and vehicles, particularly through the emission of carbon dioxide and other greenhouse gases. Dealing with these issues includes the implementation of the measures of mitigating the causes of climate change, primarily the reduction of greenhouse gas emissions, and the measures of adapting to climate change (flood barriers, the planning of new urban development, the use of passive or highly efficient ventilation and cooling systems, water consumption managing, greening the cities), with the aim of creating sustainable cities that would provide a high quality of life for their residents with the minimal use of natural resources and with as little negative impact on the environment as possible.

In the context of the time not favourable to civil initiatives, the Healthy Cities Project is a refreshing example of persistence and dedication to the idea, and a demonstration of the reconciliation of the seemingly irreconcilable: the citizens and the local authorities. From a broader point of view, of Croatian aspirations towards European and even global trends, projects like this have a completely new significance. The developed countries adapt a trend of maximum discharge of various obligations

(particularly in the context of social services), transferring them to serious civil initiatives or to the lowest possible level of local government. Croatian society should likewise follow these trends. The difficult period of transition that awaits Croatia, from a highly centralized system to a less centralized or completely decentralized one, can be at least partially facilitated by relying on such projects that testify to the success of civil initiatives, and provide the experience, human resources and a well-organized network for a fast and effective flow of information. The aim of this paper has been achieved, since it analysed the problem of environmental pollution, and proposed the economic instruments and the adjustment methods of cities to these changes. It can be concluded that ecological cities may become economic cities in a way that they plan, design, invest, and manage integrated urban systems, moving away from single-purpose, short-term and sector-specific approaches to multi-purpose, long-term and integrated solutions. We can emphasize that urban sustainability, which takes into account the social, economic and environmental aspects, particularly addressing the issue of climate change, is the only possible way to achieve a synergy of all aspects of the city, in order to create cities of the future that will successfully deal with all the arising challenges that will arise.

Finally, we must stressed the importance of raising public awareness of the fact that citizens can become agents of change and contribute to the creation of a better urban future by engaging in actions towards sustainable cities and proposing positive solutions to urban challenges.

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