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# Transition To *A Green Economy* In The Context Of Selected European And Global Requirements For Sustainable Development

## Abstract

*The aim of the paper is to present selected aspects of sustainable development related to environmental protection and the creation of a green economy, with special reference to the global and European context for the development of an environmentally friendly goods and services market, taking into account the cases of Central and Eastern European countries. One of the most important elements of the strategy to promote clean economic growth and foster the transition to a more sustainable and greener economy is the energy sector, where the aim is to reduce greenhouse gas emissions and sulfur oxides and support the development of renewable energy sources. Some of the achieved results in this area are presented in this paper.*

***Keywords****: sustainable development, environmentally friendly goods and services, green economy, energy policy*

## 1. Introduction

The aim of the paper is to discuss selected aspects of sustainable development related to environmental protection and the creation of a green economy. The strategy of sustainable development in this area is promoted by:

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1. Enhancing international cooperation in the production of environment friendly technologies and products;
2. Restructuring of the economy, with special reference to sunset industries (which rely on old technologies of coal-based products, heavy metals, heavy chemicals etc.);
3. Promotion of renewable energy sources and economic development based on increased energy efficiency and low emissions of greenhouse gases.

In this paper we consider the strong correlation between economic policy and the new environmental and energy policies, taking into consideration their relationship to international environmental standards and, as a result, better access to global and regional markets[1].

## 2. The global and European background for the development of an environmentally friendly goods and services market

The total market size of the environment industry was estimated at 600 billion US$ in 2010. Most of its growth will take place in developing countries and economies in transition, at an annual rate of 8 to 12 per cent[2]. In relative terms, this environmental market is not as big as the steel or agriculture markets, but roughly the same size as the pharmaceuticals and information technology markets[3]. The eco-industries sector in the EU has a turnover of around € 227 billion, corresponding to 2.2% of the GDP of the EU. This includes waste treatment (€ 52 billion) and recycling (€ 24 billion, with over 500,000 jobs). The recycling sector is made up of over 60,000 companies, with the following profile: 3% large; 28% medium; 69% small[4].

[1] Wysokinska Z., "Adaptation to European and international ecological norms and standards in the Czech Republic, Hungary, and Poland, Ecological competitiveness of Polish enterprises - results of a questionnaire research", *IT&FA Proceedings*, Bangkok, 2000, pp 3-12; compare also, Wysokinska Z, Witkowska J.; International Business and Environmental Issues - Some Empirical Evidence from Transition Economies, *Polish Journal of Environmental Studies*, Vol. 14 No. 3 (2005), pp. 269-279.

[2] Trade and Environment Review 2003, UNCTAD, New York and Geneva, 2004, p.36; WTO, (2003); Report to the 5th Session of the WTO Ministerial Conference in Cancun, WT/CTE/8, 11 July, 2003, p.7.

[3] As above.

[4] "Accelerating the Development of the Market for Recycling in Europe", *Report of the Taskforce on Recycling*, Composed in preparation of the Communication "A Lead Market Initiative for Europe"{COM(2007) 860 final}, p. 2.

While the United States and Japan have taken the lead in biotechnology and nanotechnology, the EU leads the way in environment-related technology (solid wastes, renewable energy and motor vehicle pollution abatement), with Germany playing a very active role. Japan is second to the EU in all three environmental technology fields[5].

With natural resources being increasingly depleted, energy is becoming a key issue, and proper and effective waste management is an increasing challenge. Moving towards sustainable patterns of consumption and production are the cornerstones of all development that is sustainable – not only in terms of energy but in terms of *all* the resources we produce, consume and dispose of. Recycling plays an fundamental role in this aspect by:

- reducing disposable waste,
- reducing the consumption of natural resources,
- improving energy efficiency.

Demand and price for raw materials are increasingly affected by global forces, and there are indications that international trade in recycled material will continue to grow. There is significant market potential in recycling to increase efficiency and capacity, which also encourages innovation and introduces more effective processes and improved technologies. These can help save costs, energy, and natural resources – and help make Europe less dependent on raw materials with their rising prices. Recycling also belongs to the six most important sectors within the Lead Market Initiative for Europe (Lead Market)[6]. The Lead Market proposes *a package of polices* (legislation, standards and labeling, public procurement, financing, knowledge-sharing, and international actions) that can act in synergy to foster recycling markets, provide more and better recycling, yield environmental and economic gains, and in the long run improve Europe's competitive position[7]. The EU is estimated to have around one third of the global share of eco-industries and a 50% share of the world market in the waste and recycling industries[8].

The predicted growth of more than 15% in the level of sales of environmental services over the next decade includes an additional, approximately 42 billion USD

[5] OECD SCIENCE, TECHNOLOGY AND INDUSTRY SCOREBOARD 16 2007 – ISBN 978-92-64-03788-5 – © OECD 2007, p.p.9-16.

[6] Recycling is one of the leading markets among: *e*-health, protective textiles, sustainable construction, recycling, bio-based products, and renewable energies, compare: Lead Market Initiative for Europe; http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/#2#2

[7] Accelerating the Development of the Market for Recycling in Europe, op cit, pp.3-4.

[8] As above.

increase in demand on the world market, providing employment for approximately 1–2 million workers. The rapid development of the environmental services market in the Central and Eastern European (CEE) countries, formerly centrally planned and transition economies, and their adaptation to EU and global requirements, can offer many positive examples for developing countries in the difficult path towards the creation of more efficient, cleaner and greener economies (Wysokińska 2008).

The labor market initiative related to the creation of green jobs is strictly connected with the concept of sustainable development. Green jobs include jobs that help to protect ecosystems and biodiversity; reduce the consumption of energy, materials, and water through high efficiency strategies; de-carbonize the economy; and minimize or altogether eliminate the generation of all forms of waste and pollution[9].

In 2005, the European Commission laid the foundations for an EU strategy to combat climate change. This document now sets out more concrete steps to limit the effects of climate change and to reduce the risk of massive and irreversible disruptions to the planet. These short-term and medium-term measures target both developed countries (the EU and other industrialized countries) and developing countries[10]. A year earlier an environmental technologies action plan for the European Union was prepared by the European Commission, aimed at stimulating technologies for sustainable development[11]. This action plan, designed to support environmental technologies, concerns technologies to manage pollution, lessen polluting and lessen reliance on resource-intensive products and services, as well as to devise ways to manage resources more efficiently. These environmentally friendly technologies pervade all economic activities and sectors. They cut costs and improve competitiveness by reducing the consumption of energy and resources, which results in fewer emissions and less waste[12].

[9] http://www.unep.org/labour_environment/PDFs/Greenjobs/UNEP-Green-Jobs-Report.pdf.

[10] Communication from the Commission, 2007, COM 2007; final

[11] Communication from the Commission to the Council and the European Parliament, 2004, COM 2004; 38; final

[12] As above.

## 3. Characteristics of the market of environmentally friendly goods and services - market volume and market shares

Compared to other markets, it should be noted that the environmental products and services market is not as large as the steel or agricultural markets. However, its size is comparable with the pharmaceutical or information technology markets[13]. The environmental products market encompasses three main segments—equipment (technical equipment), environmental services, and natural resources. Technical equipment obviously encompasses the most advanced technologies, while environmental services include simpler, albeit more common technologies. The predicted growth of more than 15% in the sales of environmental services compared to the past decade projects an additional increase in demand on the world market of approximately 42 billion USD, providing employment for 1–2 million workers. The highly developed countries are the largest producers of environmental services (United States – approximately 38% of the world market, Japan – approximately 18%, followed by Germany, Great Britain, France, and Italy). The share of Eastern Europe in this market is only around 2% (inclusive of the European part of the CIS), with Poland's share being between 0.3% and 0.4% (Wysokińska 2009, pp. 941-948).

The environmental markets in highly developed countries are extremely competitive. Environmental regulations are among the most important market factors. The capacity to produce environmental products and services is growing dynamically in many developing countries, primarily thanks to collaboration between established companies as well as due to the increased demand on the internal market. Nevertheless, there is little data to corroborate that this is also reflected in export.

The present barriers to trade, understood as what are known as "bound tariffs", which are tied to many capital–intensive goods, are an important aspect of the rendering of services in the area of waste management. They are low in highly developed countries (below 3% for products found on the list of OECD countries). Many developing countries have their customs rates set at relatively high levels—10% to 20%. In certain cases the tariffs are exceptionally high[14]. In practice, the import of environmental products and services may benefit, in the preliminary stage, from many incentives. Technical regulations offer support in the adaptation of environmental products and services to environmental requirements. However, the dearth of uniform environmental requirements in various national markets is a significant extra–tariff barrier. It should be noted

[13] Trade and Environment Review 2003, United Nations, 2004, p. 36.

[14] Trade and Environment Review 2003, United Nations, 2004; compare also: Wysokinska Z., 2005).

that standards and certification have an impact on trade in environmental products and services. Trade in niche products searching for new markets may be hindered as a result of the lack of appropriate standards or certification procedures for such products. Thus, imported environmental technologies should be tested and certified by local authorities in individual markets (Vikhlyaev 2004).

At present, providing support for sustainable growth – i.e. for a resource-efficient, greener and more competitive economy - is one of three objectives of the Strategy Europe 2020, which sets forth the EU's main growth strategy for the coming decade[15].

Within this overall strategy the European Commission proposes a new economic strategy for Europe, identifying three key drivers for growth, to be implemented through concrete actions at EU and national levels:

- smart growth (fostering knowledge, R+D, innovation, education and the digital society),
- sustainable growth (making our production more resource-efficient while boosting R+D and competitiveness);
- inclusive growth (raising participation in the labour market, enhancing the acquisition of skills, and combating poverty)[16].

Sustainable growth means, above all, protecting the environment, reducing emissions and preventing biodiversity loss, and capitalizing on Europe's leadership in developing new green technologies and production methods in order to build a more competitive green and low carbon economy that makes efficient, sustainable use of resources[17].

## 4. The case of the CEE countries – an environmental friendly products and services market

In their process of accession to the EU and adaptation to European environmental standards, the **CEE new member states** undertook significant steps in the 1990s and later to improve their natural environments, increasing their imports of goods designed to aid in environmental protection and technologies for the implementation of "clean production" of goods for export.

[15] http://ec.europa.eu/europe2020/index_en.htm

[16] Strategia na rzecz inteligentnego i zrównoważonego rozwoju sprzyjającego włączeniu Społecznemu (Strategy for smart, sustainable, and inclusive growth), KOMUNIKAT KOMISJI EUROPA 2020; Brussels, 3.3.2010 ; COM(2010) 2020

[17] As above.

These steps should improve the competitiveness of Polish, Czech, and Hungarian goods and products in the future on both the European and global markets. Research results confirm the pro-ecological emphasis of the transition economies' restructuring efforts, particularly when read together with the significant increase in their foreign trade in pro-ecological goods and services.

In the case of firms with foreign ownership, the effect of compliance with environmental norms and standards on their share of the domestic market was very slight, while the effect of compliance with environmental norms and standards on their share of the export market is somewhat greater, but still modest. An analysis of the results shows that most foreign investors do take environmental protection issues into account in making their decisions, but they do not consider them to constitute a major investment factor. A majority of the respondents favor centralizing strategies. This strategy seems advantageous for recipient countries. Firms with foreign capital frequently introduce environmental protection norms and take part in environmental protection programs (Wysokińska, Witkowska 2005, p. 279). Effects achieved by the CEE countries' transition economies can be a very good example for other developing countries in their future path to adapt to environmental protection standards, and in the process to create a much more environmentally friendly "green economy".

Products fostering environmental protection[18] have gradually increased their share in total trade turnover in the CEE countries. These changes were particularly noticeable in the European direction (Wysokińska 2005, p. 944). Although the countries of Western Europe and other highly developed countries hold dominant shares not only in the market for world environmental products but also for environmental services, they have been facing a steady decline in the development of exports of these services over recent years. The basic classification of environmental services includes: sewage management and water protection, with this sector includes water distribution services by pipelines, excluding hot water and sewage management pipelines; waste management, including the disposal of garbage and wastes, contract–based metal wastes and scrap processing; wholesale and retail trade in wastes, scrap metal, and other materials for recycling; snow removal and storage services etc. Environmental services include environmental research and development services, advisory services, contracts and environmental engineering, analysis services, data

[18] Products fostering environmental protection were classified into three basic groups: 1) Products and services related to waste management, 2) Cleaning technologies and products, and 3) Products relating to managing processes preventing the creation of pollution. More on this topic may be found in Wysokińska Z., "The International Environmental Goods and Services Market …," (Wysokinska Z., 2005., p. 943).

collection, estimates, construction, transportation, and other services (including spatial planning services) (Wysokińska 2009, pp. 953-954).

Due to the growing operating costs in the environmental services sector in the developing countries, which are mainly the result of their high salary levels, it may be expected that in the upcoming years there will be greater expansion and investments by Western European companies (mainly from the countries of the European Union such as France, the Netherlands, and Belgium as well as Switzerland), as well as by other highly industrialized economies into both developing countries and countries that have recently undergone systemic transformation. These also include the CEE countries, including mainly the four greatest producers of environmental services in the CEE area, which include Poland, the Czech Republic, Estonia, and Russia.

The better and continuously improving access to the world environmental market is witnessed by the previously carried out liberalization of trade within the framework of OECD countries, in line with WTO requirements, as well as in the significantly slower, but nonetheless growing, rate of liberalization of trade taking place in developing countries.

The market volume of developing countries in the environmental services' world market is estimated at approximately 8.5%, with a steady growth trend over recent years. Their share in world exports and imports of these services oscillated around the 6%–7% mark in world trade, while in world environmental services production their share exceeds 8%. This shows the growing involvement of domestic environmental service providers in these countries, and the even greater degree of growth in foreign investments (from the highly developed countries) in this sector, potentially one of the most dynamically developing sectors of the world economy[19].

## 5. Promotion of poles of clean growth to foster the transition to a more sustainable and greener economy

The main objective in the world economy, as well as in the European economy for the nearest future, is to promote poles of clean growth to foster the transition to a more sustainable and greener economy.

[19] These conclusions are derived from an expert report entitled "Ocena szans Polski na międzynarodowym rynku wyrobów i usług środowiskowych" [An assessment of Poland's chances on the international environmental product and services market] prepared by the author for the Ministry of the Economy in Poland in 2007-2010 (modified version).

The global perspective has been presented by UNEP's Energy branch, which focuses on aiding governments and regions—particularly in developing countries—make the green energy transition, offering support and training concerning technical assessments, policies, and finance. It has been stressed that increasing the use of renewable energies is the solution for a greener future in the world economy. As populations and incomes grow, so does the demand for energy. Our thirst for energy services is one of the biggest challenges to mitigating climate change and building a greener future. While the global community wrestles with climate change, it must also grapple with a host of issues resulting from current patterns of energy consumption, including energy security, pollution, and enduring energy poverty. The current heavy reliance on a fossil fuel energy system is not only environmentally unsustainable, but also highly inequitable, leaving some 1.4 billion people around the globe without access to electricity. Moreover, much of this growing energy demand is occurring in developing countries, where rising fossil fuel prices and constraints on resources are putting additional pressure on both the environment and the economy.

In 2010, new investments in renewable energies reached a record high of 211 billion US$, with noticeable growth in the emerging economies. While there is much progress to be made, decreasing costs and expanding deployment of generators combine to make the renewable energy more and more competitive with fossil fuels, especially when the latter's negative externalities, like pollution and impacts on health, are taken into account. But in order to move towards a greener energy path, governments and local institutions will need to increase their involvement[20].

According to UNCTAD data, two-thirds of the total renewable power capacity (including wind, biomass, solar and geo-thermal power) belongs to the developed market economies, and one-third to the developing countries. Technological progress and greater investments and deployment are lowering the costs of established Renewable Energy Technologies. Global Investments in renewable energy and related technologies during the period 2004-2010 increased from 33 to 211 billion USD. The average annual growth rate amounted to 38.3%[21].

Since the entry into force of the WTO in 1995, the WTO Dispute Settlement Body has also had to deal with a growing number of disputes concerning environment-related trade measures. Such measures have sought to achieve a variety of policy objectives — from conservation of sea turtles from

[20] http://www.unep.org/climatechange/mitigation/Energy/tabid/104339/Default.aspx

[21] According to UNCTAD, Technology and Innovation Report (2011).

incidental capture in commercial fishing to the protection of human health from risks posed by air pollution.

Within the WTO Conference on "Energy, Trade and Global Governance" of 22 October 2009, organized by the Centre for Trade and Economic Integration (CTEI), the WTO has established a framework of cooperation that includes services incident to the extraction of oil and gas and services incidental to energy distribution and the pipeline transportation of fuels.

## 6. Energy and its relationship to trade and to trade governance

The treatment of **international commerce in energy and energy services** in policy terms is quite different from that of many other products in sectors such as manufacturing and agriculture. This differences include factors such as:

1. Much of today's energy supply — particularly fossil fuels and natural gas — is geographically concentrated, fixed in terms of location, and prominent in the production and trade of those countries that possess the resource.
2. Thus, trade patterns on the supply side change only slowly (Russia, Kazakhstan, Azerbaijan, Algeria, Libya, Iran, Iraq, Sudan), in contrast to the shifting comparative advantage we associate with economies that are less resource-endowed (Europe, especially Western Europe).
3. In contrast to the geographical concentration that characterizes the supply side of energy markets, demand is very widespread because every country needs energy to run their economies. This relationship between supply and demand has important implications for the economic and political conditions under which trade takes place.
4. A second feature of today's key energy products is that they are scarce and non-renewable. Combined with their fixed and concentrated location, this makes for less direct competition in their production.
5. Factors contributing to the energy market include supply uncertainties, inelastic demand due to the lack in the short term of substitutes for traditional energy products, and the role of speculation and political uncertainty in some producing countries.
6. Trade and the traditional WTO trade rules do not play their "standard" role in many energy markets.

7. Many of these issues are being negotiated in the on-going Doha Round, including: energy services, transit rules, and subsidies for climate friendly goods and services.
8. It is important to increase transparency with respect to trade-related measures adopted for the goal of a green economy, and also to lend support to developing countries as they try to adapt their economies to green challenges and opportunities. In both cases, countries can use the tools and initiatives developed in the multilateral trading system of the WTO[22].
9. A reduction in the barriers to trade in environmental goods and services could improve access to a broader range of cheaper and more efficient goods and services that can help meet environmental goals. Increasing the use of environmental goods and services can yield a range of benefits, including reduced air and water pollution, resource conservation, and improved energy efficiency[23].

The objective to promote poles of clean growth to foster the transition to a more sustainable and greener economy is to be achieved in Europe within the new EU Energy Policy 20-20-20. Within this policy EU leaders have agreed a set of targets, to be met by 2020, that have come to be known as the "20-20-20 targets". These aim to:

- reduce EU greenhouse gas emissions to at least 20% below 1990 levels
- increase to 20% the proportion of EU energy consumption coming from renewable sources
- reduce the amount of primary energy used – through energy efficiency - by 20% compared with projected levels.

The EU has even offered to reduce its emissions by 30% if other major economies would commit to comparable emission reductions or make adequate contributions.

In "A roadmap for moving to a competitive low-carbon economy in 2050", the European Commission also looked at new ways of reducing greenhouse gas emissions by 80 to 95% by the middle of the century[24]. It is

[22] Harnessing Trade for Sustainable Development and a Green Economy, World Trade Organization Centre William Rappard, Switzerland, Chapter II, p.2., Chapter IV, pp. 6-8 and p. 10-11.

[23] As above, p. 17, compare also: "Foreign Trade in Environmental Products; The WTO Regulation and Environmental Programs," Global Economy Journal; op.cit., pp. 1- 25. http://www.bepress.com/gej/vol5/iss3/5

[24] Climate action; http://europa.eu/pol/clim/index_en.htm

possible to identify three main factors stimulating the building of the EU common internal energy market:

**a) EU Emissions Trading System**

This is the cornerstone of the EU's climate change strategy, and is gradually reducing industrial emissions in the most cost-effective way possible. Under the system, energy-intensive industries like power generation or steel and cement have to surrender allowances every year for every ton of $CO_2$ they emit. In principle, they receive a certain number of allowances for free, but if they need more, they must buy them on the carbon market. They can also offset emissions by investing in $CO_2$ reductions in developing countries. Since the EU's Emission Trading System (ETS) started in 2005, more and more businesses have joined. Airlines have been a part of the system since 2012. In the future, more allowances will be auctioned instead of allocated for free[25].

**b) Free movement of energy in the EU**

Electricity and gas are transported in grids and pipelines that often cross national borders. The energy policy decisions made by one country inevitably have an impact on other countries. Ensuring that energy can be freely traded in the EU will help deliver:

- competitive prices,
- more choice for consumers,
- greater security of supply,
- security for investors in new renewable technologies and infrastructure[26].

**c) Fully integrated EU energy internal market by 2014**

The European energy market is the world's largest regional market (over 500 million consumers) and largest energy importer. Several of the challenges facing the EU – climate change, access to oil and gas, technology development, energy efficiency – are common to most countries and call for international collaboration. Without a technological shift the EU will not achieve its 2050 ambition to decarbonise the electricity and transport industries. This requires strong international cooperation with non-EU countries in specific technologies[27].

Some results achieved by the EU member states in the reduction of green house gas emissions are presented in Table 1 and in Graph 1. It is worth noting that only 16 member states (highlighted in bold) achieved positive results in green house gas emissions during the decade 2001-2010. Progress is still required from the rest.

[25] EU Emissions Trading System; http://europa.eu/pol/clim/index_en.htm

[26] EU Energy policy, http://europa.eu/pol/ener/index_en.htm

[27] http://europa.eu/pol/ener/index_en.htm

**Table 1. Total Greenhouse Gas Emissions (source: EEA)**

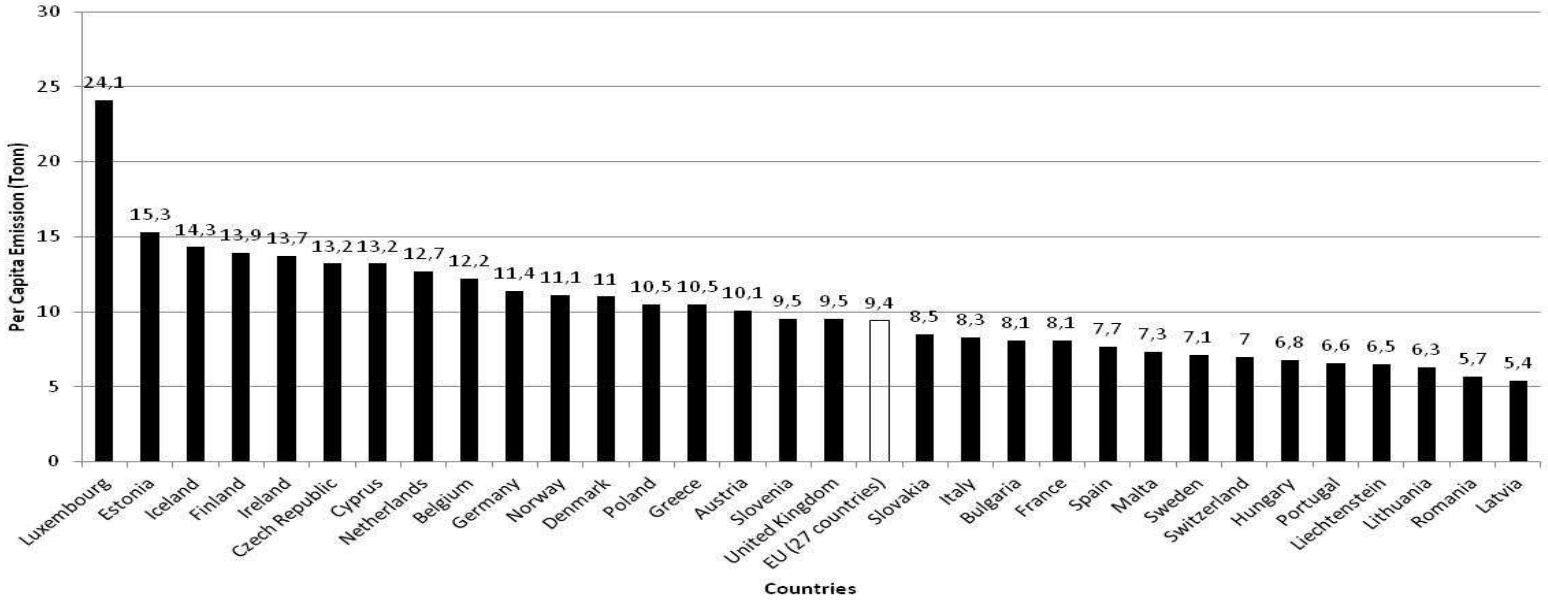
| Total Greenhouse Gas Emissions (source: EEA) | | | | | | | | Population 2010 | Per Capita Emision |
|---|---|---|---|---|---|---|---|---|---|
| 1 000 tonnes of $CO_2$ equivalent | | | | | | | | | |
| geo\time | 2000 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Mlns | Tonn |
| | | | | | | | | 2010 | 2010 |
| Luxembourg | 9596 | 12950 | 12798 | 12211 | 12047 | 11515 | 12075 | 0.5 | 24.1 |
| Estonia | 17220 | 18565 | 18000 | 21129 | 19705 | 16391 | 20517 | 1.3 | 15.3 |
| Iceland | 3845 | 3819 | 4345 | 4574 | 4959 | 4700 | 4542 | 0.3 | 14.3 |
| **Finland** | **69239** | **68623** | **79834** | **78195** | **70243** | **66119** | **74556** | 5.4 | 13.9 |
| **Ireland** | **68103** | **69315** | **68897** | **68303** | **67567** | **61741** | **61314** | 4.5 | 13.7 |
| **Czech Republic** | **145775** | **146326** | **148448** | **148848** | **143663** | **134722** | **139158** | 10.5 | 13.2 |
| Cyprus | 10108 | 11081 | 11495 | 11418 | 11405 | 11103 | 10838 | 0.8 | 13.2 |
| Netherlands | 213201 | 210964 | 206960 | 205519 | 204569 | 198931 | 210053 | 16.6 | 12.7 |
| **Belgium** | **146154** | **143623** | **138839** | **133927** | **136686** | **125187** | **132459** | 10.8 | 12.2 |
| **Germany** | **1038999** | **997277** | **998895** | **976992** | **975967** | **911802** | **936544** | 81.8 | 11.4 |
| Norway | 53443 | 53765 | 53594 | 55521 | 53820 | 51470 | 53896 | 4.9 | 11.1 |
| **Denmark** | **68090** | **63740** | **71610** | **67021** | **63554** | **60683** | **61065** | 5.5 | 11.0 |
| Poland | 384745 | 388917 | 404735 | 407131 | 401339 | 381770 | 400865 | 38.2 | 10.5 |
| **Greece** | **127054** | **135661** | **132151** | **135046** | **131263** | **124693** | **118287** | 11.3 | 10.5 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Austria | 80470 | 92880 | 90059 | 87366 | 86956 | 79739 | 84594 | 8.4 | 10.1 |
| Slovenia | 18823 | 20344 | 20583 | 20712 | 21431 | 19469 | 19522 | 2.0 | 9.5 |
| **United Kingdom** | **669879** | **654094** | **649596** | **640035** | **626072** | **572338** | **590247** | 62.0 | 9.5 |
| EU (27 countries) | 5078135 | 5148712 | 5132293 | 5078976 | 4974387 | 4609880 | 4720878 | 501.1 | 9.4 |
| **Slovakia** | **49339** | **51213** | **51040** | **48870** | **50078** | **44191** | **45982** | 5.4 | 8.5 |
| **Italy** | **551570** | **574749** | **563989** | **555761** | **541589** | **491528** | **501318** | 60.3 | 8.3 |
| **Bulgaria** | **62892** | **66361** | **67403** | **70908** | **68604** | **58895** | **61427** | 7.6 | 8.1 |
| **France** | **564800** | **567109** | **552408** | **541999** | **537297** | **514568** | **522373** | 64.7 | 8.1 |
| **Spain** | **380831** | **435428** | **427227** | **436327** | **403819** | **366266** | **355898** | 46.0 | 7.7 |
| Malta | 2602 | 3027 | 3019 | 3126 | 3094 | 3016 | 3035 | 0.4 | 7.3 |
| **Sweden** | **68959** | **67384** | **67273** | **65599** | **63599** | **59671** | **66232** | 9.3 | 7.1 |
| **Switzerland** | **51884** | **54398** | **53993** | **52038** | **53798** | **52461** | **54247** | **7.8** | **7.0** |
| **Hungary** | **77270** | **79486** | **77756** | **75649** | **73292** | **66864** | **67679** | 10.0 | 6.8 |
| **Portugal** | **82293** | **86540** | **81509** | **79020** | **77825** | **74372** | **70599** | 10.6 | 6.6 |
| Liechtenstein | 256 | 272 | 274 | 245 | 265 | 249 | 233 | 0.0 | 6.5 |
| Lithuania | 19364 | 22919 | 23314 | 25443 | 24331 | 19959 | 20810 | 3.3 | 6.3 |
| **Romania** | **140520** | **148889** | **152792** | **150245** | **146668** | **123382** | **121355** | 21.5 | 5.7 |
| Latvia | 10238 | 11247 | 11663 | 12176 | 11724 | 10962 | 12077 | 2.2 | 5.4 |

Remark: Countries highlighted in **bold** above achieved positive results in the reduction of greenhouse gas emissions during the period 2000-2010.

Source: Own calculations based on Eurostat-database.

**Graph 1. Per Capita Greenhouse Gas Emission**




Source: Based on own calculations presented in the Table 1.

**Table 2. Generation of total waste**

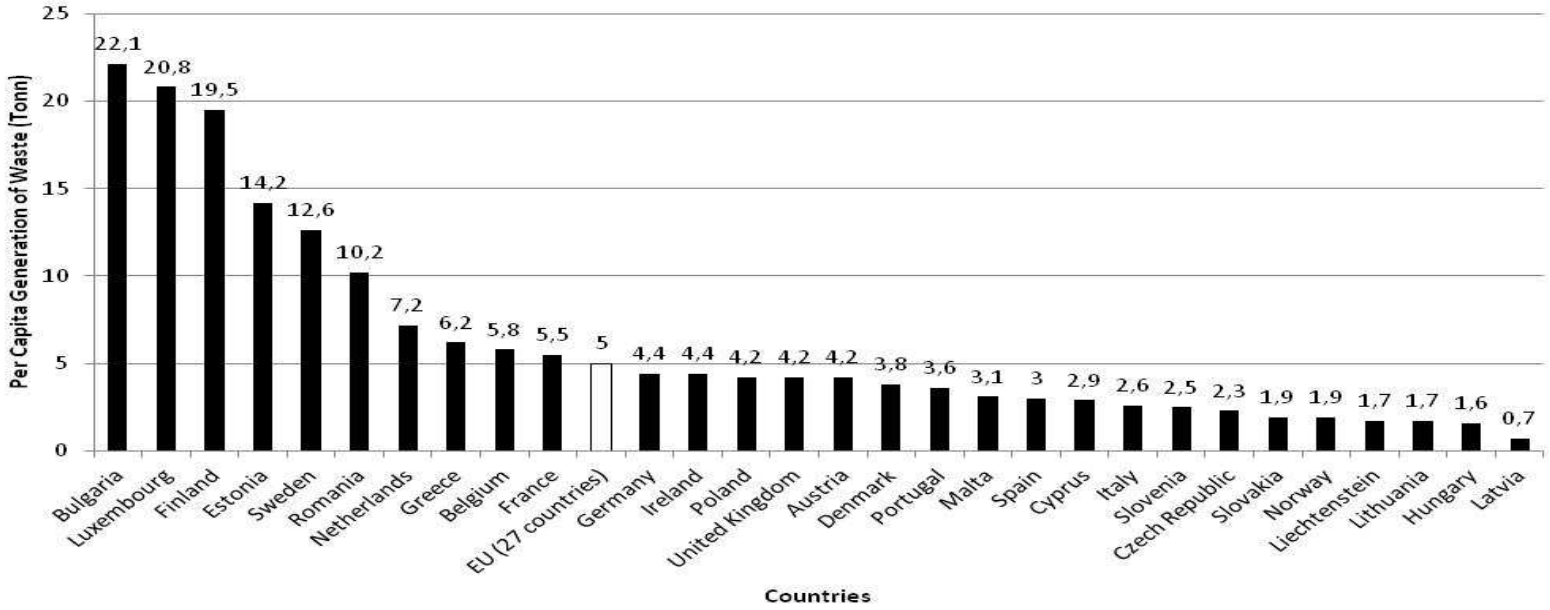
| | 2004 | 2006 | 2008 | 2010 | Mlns | Tonn |
|---|---|---|---|---|---|---|
| **Country** | | | | | **Population 2010** | **Per Capita Generation of Waste** |
| **Bulgaria** | **201020** | **162881** | **167646** | **167203** | 7.6 | 22.1 |
| Luxembourg | 8316 | 9586 | 9592 | 10440 | 0.5 | 20.8 |
| Finland | 69708 | 72205 | 81793 | 104337 | 5.4 | 19.5 |
| **Estonia** | **20861** | **18933** | **19584** | **19000** | 1.3 | 14.2 |
| Sweden | 91759 | 94971 | 86169 | 117618 | 9.3 | 12.6 |
| **Romania** | **369300** | **344357** | **189311** | **218830** | 21.5 | 10.2 |
| Netherlands | 88099 | 94309 | 99591 | 119255 | 16.6 | 7.2 |
| Greece | 34953 | 51325 | 68644 | 70433 | 11.3 | 6.2 |
| Belgium | 52809 | 59352 | 48622 | 62537 | 10.8 | 5.8 |
| France | 302992 | 320427 | 345002 | 355081 | 64.7 | 5.5 |
| EU (27 countries) | 2620030 | 2638120 | 2491300 | 2502890 | 501.1 | 5.0 |
| Germany | 364022 | 363786 | 372796 | 363545 | 81.8 | 4.4 |
| **Ireland** | **24499** | **29599** | **22503** | **19808** | 4.5 | 4.4 |
| Poland | 154713 | 170230 | 138742 | 159458 | 38.2 | 4.2 |
| **United Kingdom** | **357544** | **346144** | **334127** | **259068** | 62.0 | 4.2 |
| **Austria** | **53021** | **54287** | **56309** | **34883** | 8.4 | 4.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Denmark | 12589 | 14703 | 15155 | 20965 | 5.5 | 3.8 |
| Portugal | 29317 | 34953 | 36480 | 38347 | 10.6 | 3.6 |
| Malta | 3146 | 2861 | 2399 | 1288 | 0.4 | 3.1 |
| **Spain** | **160668** | **160947** | **149254** | **137519** | 46.0 | 3.0 |
| Cyprus | 2242 | 1249 | 1843 | 2373 | 0.8 | 2.9 |
| Italy | 139806 | 155025 | 179034 | 158628 | 60.3 | 2.6 |
| **Slovenia** | **5771** | **6036** | **5038** | **5159** | 2.0 | 2.5 |
| **Czech Republic** | **29276** | **24746** | **25420** | **23758** | 10.5 | 2.3 |
| Slovakia | 10668 | 14501 | 11472 | 10545 | 5.4 | 1.9 |
| Norway | 7454 | 9913 | 10287 | 9433 | 4.9 | 1.9 |
| Liechtenstein | : | : | 383 | 62 | 0.0 | 1.7 |
| **Lithuania** | **7010** | **6564** | **6333** | **5583** | 3.3 | 1.7 |
| **Hungary** | **24661** | **22287** | **16949** | **15735** | 10.0 | 1.6 |
| Latvia | 1257 | 1859 | 1495 | 1498 | 2.2 | 0.7 |
| 1000 Tonnes | | | | | | |
| All NACE activities plus households | | | | | | |
| Iceland | 501 | : | : | : | 0.3 | |
| Switzerland | : | : | : | : | 7.8 | |
| :=not available, s=Eurostat estimate, e=estimated ,c=confidential | | | | | | |

Remark: Countries highlighted in **bold** achieved **positive results** in the **reduction of total waste** during the period 2000-2010.

Source: Own calculations based on Eurostat-database.

**Graph 2. Ranking of per Capita Generation of total waste/*according to Eurostat***




Source: Based on own calculations presented in the Table 2.

**Table 3. Total Emissions of sulfur oxides (SOx)**

| | | | | | | | | | Population 2010 | Per Capita Emission of Sulfur Oxides |
|---|---|---|---|---|---|---|---|---|---|---|
| **Country/years** | **1990** | **2000** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **Mlns** | **Kgs** |
| **Norway** | **52197** | **27143** | **23939** | **21045** | **20052** | **20123** | **15438** | **19413** | 0.0 | 540.8 |
| Iceland | 20412 | 35006 | 40288 | 44522 | 59480 | 73936 | 76571 | 72426 | 0.3 | 228.0 |
| Turkey | 835229 | 1452883 | 878650 | 974270 | 1004273 | 1041050 | 1058315 | 1660958 | 7.8 | 213.3 |
| **Estonia** | **273609** | **96959** | **76282** | **69935** | **87969** | **69375** | **54826** | **83220** | 1.3 | 62.1 |
| **Bulgaria** | **1099503** | **861333** | **776271** | **762884** | **819496** | **569137** | **440367** | **387207** | 7.6 | 51.2 |
| **Cyprus** | **30930** | **47766** | **37944** | **31548** | **29505** | **22809** | **17943** | **22079** | 0.8 | 27.0 |
| **Poland** | **3210000** | **1511000** | **1223933** | **1237455** | **1131030** | **1018371** | **861682** | **973587** | 38.2 | 25.5 |
| **Greece** | **473434** | **495063** | **537872** | **532663** | **537429** | **443723** | **424517** | **264007** | 11.3 | 23.4 |
| **Malta** | **15779** | **24315** | **11374** | **11479** | **11790** | **10762** | **7997** | **8113** | 0.4 | 19.6 |
| **Romania** | **821230** | **523502** | **642584** | **697431** | **577201** | **566204** | **459868** | **371976** | 21.5 | 17.3 |
| **Czech Republic** | **1875524** | **264448** | **218633** | **211226** | **216964** | **174340** | **173473** | **170331** | 10.5 | 16.2 |
| **Slovakia** | **524128** | **126952** | **89007** | **87751** | **70557** | **69404** | **64082** | **69406** | 5.4 | 12.8 |
| **Finland** | **262514** | **79307** | **69248** | **84306** | **82736** | **70121** | **59239** | **66788** | 5.4 | 12.5 |
| **Lithuania** | **228108** | **51269** | **42071** | **41750** | **33759** | **27041** | **29512** | **38084** | 3.3 | 11.4 |
| **Spain** | **2180477** | **1512987** | **1325129** | **1216864** | **1208166** | **566250** | **514168** | **482682** | 46.0 | 10.5 |
| EU (27 countries) | 24856821 | 10237929 | 7884379 | 7632923 | 7231993 | 5714721 | 4849815 | 4574478 | 501.1 | 9.1 |
| **United Kingdom** | **3707179** | **1227948** | **706007** | **664972** | **586036** | **491137** | **397319** | **406429** | 62.0 | 6.6 |

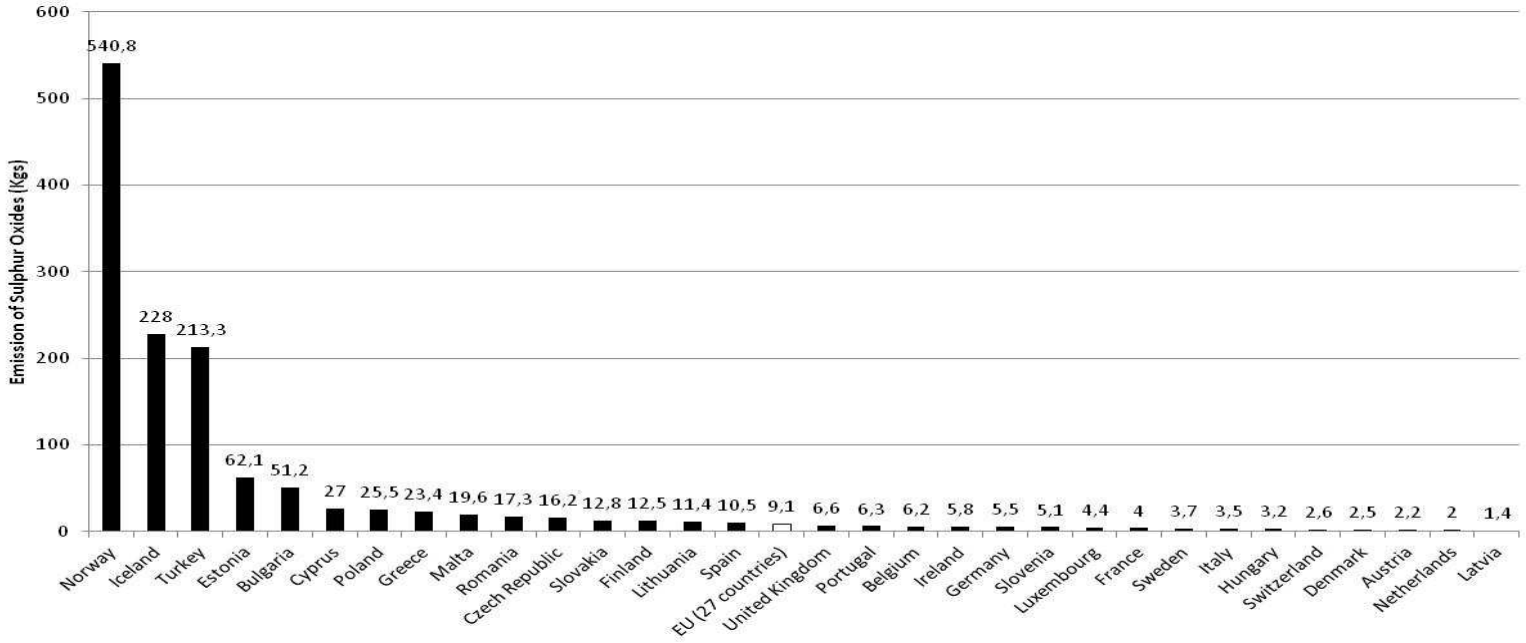
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Portugal** | **294861** | **281153** | **177283** | **155414** | **149419** | **107851** | **74275** | **67061** | 10.6 | 6.3 |
| **Belgium** | **361840** | **171941** | **145184** | **135091** | **125429** | **97352** | **76748** | **67226** | 10.8 | 6.2 |
| **Ireland** | **182320** | **139536** | **71131** | **61222** | **55408** | **45500** | **32638** | **25885** | 4.5 | 5.8 |
| **Germany** | **5292041** | **653192** | **517315** | **519815** | **497134** | **490399** | **434696** | **449399** | 81.8 | 5.5 |
| **Slovenia** | **198061** | **92069** | **39882** | **16068** | **13961** | **12752** | **10620** | **10387** | 2.0 | 5.1 |
| **Luxembourg** | **15199** | **3470** | **2558** | **2263** | **2398** | **2268** | **2241** | **2210** | 0.5 | 4.4 |
| **France** | **1353913** | **643567** | **467300** | **428756** | **411641** | **343979** | **289268** | **261606** | 64.7 | 4.0 |
| **Sweden** | **105042** | **41584** | **35866** | **35617** | **32622** | **30457** | **29603** | **34472** | 9.3 | 3.7 |
| **Italy** | **1794240** | **749480** | **402526** | **380703** | **338231** | **283494** | **232148** | **210185** | 60.3 | 3.5 |
| **Hungary** | 9638 | **488940** | **147774** | **123109** | **98600** | **105590** | **89371** | **32295** | 10.0 | 3.2 |
| **Switzerland** | **40849** | **16314** | **16874** | **15477** | **13628** | **13940** | **12383** | **12861** | 4.9 | 2.6 |
| **Denmark** | **176371** | **29294** | **22938** | **26412** | **23622** | **18742** | **14280** | **14038** | 5.5 | 2.5 |
| **Austria** | **74454** | **31716** | **27148** | **28142** | **24542** | **22107** | **17419** | **18760** | 8.4 | 2.2 |
| **Netherlands** | **191597** | **73016** | **64510** | **64186** | **60668** | **50864** | **37408** | **33886** | 16.6 | 2.0 |
| **Latvia** | **104829** | **16123** | **6608** | **5860** | **5680** | **4691** | **4108** | **3158** | 2.2 | 1.4 |
| **Tonnes** | | | | | | | | | | |
| Total sectors of emissions for the national territory | | | | | | | | | | |

:=not available z=not applicable

Remark: Countries highlighted in **bold** above achieved **positive results** in the **reduction of sulfur oxide (SOx) emissions** during the period 2000-2010

Source: Own calculations based on Eurostat-database.

**Graph 3. Per Capita emission of sulfur oxides (SOx)**




Source: Based on own calculations presented in the Table 3.

## 7. Conclusions

The objective to develop an environmental friendly economy in developing countries and in transition economies is the most important challenge in the world economy in the nearest future. This objective can be achieved by close cooperation between the developed and developing countries and by solidarity in the processes of international assistance providing environmentally friendly, more efficient and cleaner technologies oriented on Low Carbon Growth.

Job creation in environmentally friendly services is, for developing countries, "a shortcut path" which helps avoid some negative consequences of traditional (“dirtier”) economic development and offers possibilities to create millions of new "green" jobs in the future.

Promotion of clean growth poles to foster the transition to a more sustainable and greener economy is one of the key objectives for the nearest future in both the European and world economies.

## References

Climate action; http://europa.eu/pol/clim/index_en.htm

Communication from the Commission of 27 January 2005: Report on the implementation of the Environmental Technologies Action Plan in 2004 [COM(2005) 16 - Official Journal C 123 of 21.05.2005]

Communication from the Commission of 27 January 2005: Report on the implementation of the Environmental Technologies Action Plan in 2004 [COM(2005) 16 - Official Journal C 123 of 21.05.2005]

Communication from the Commission to the Council and the European Parliament of 28 January 2004 entitled: "Stimulating technologies for sustainable development: an environmental technologies action plan for the European Union" [COM(2004) 38 final - Not published in the Official Journal]

Communication from the Commission, of 10 January 2007, entitled: "Limiting Global Climate Change to 2 degrees Celsius - The way ahead for 2020 and beyond" [COM(2007) 2 final - Not published in the Official Journal]

Communication from the Commission, of 10 January 2007, entitled: "Limiting Global Climate Change to 2 degrees Celsius - The way ahead for 2020 and beyond" [COM(2007) 2 final - Not published in the Official Journal]

"Environment Business International, Inc.," in *Environmental Benefits of Removing Trade Restrictions and Distortions*, Note by the Secretariat, Addendum, Committee on Trade and Environment. WT/CTE/W/67/ADD.1, March 13, 1998; "Implications of WTO Agreements for International Trade in Environmental Industries," ITC, 1999, in *Trade and Environment Review 2003*, United Nations, Geneva, New York, 2004

EU Emissions Trading System; http://europa.eu/pol/clim/index_en.htm

EU Energy policy, http://europa.eu/pol/ener/index_en.htm

Highlights OECD Science, Technology and Industry Scoreboard 2007; OECD 2007

Highlights OECD Science, Technology and Industry Scoreboard 2007; OECD 2007

http://ec.europa.eu/economy_finance/structural_reforms/europe_2020/index_en.htm

http://ec.europa.eu/economy_finance/structural_reforms/europe_2020/index_en.htm

http://europa.eu/legislation_summaries/environment/tackling_climate_change/l28188_en.htm.

http://europa.eu/pol/ener/index_en.htm

http://www.unep.org/climatechange/mitigation/Energy/tabid/104339/Default.aspx

http://www.unep.org/labour_environment/PDFs/Greenjobs/UNEP-Green-Jobs-Report.pdf

http://www.unep.org/labour_environment/PDFs/Greenjobs/UNEP-Green-Jobs-Report.pdf

Promoting poles of clean growth to foster the transition to a more sustainable economy, *Trade and Environment Review*, 2009/2010, United Nations, New York, Geneva, 2010

Strategia na rzecz inteligentnego i zrównoważonego rozwoju sprzyjającego włączeniu Społecznemu (Strategy for smart, sustainable, and inclusive development), KOMUNIKAT KOMISJI EUROPA 2020; Brussels, 3.3.2010 ; COM(2010) 2020

*UNCTAD Technology and Innovation Report , UNCTAD/UN, Geneva/New York, (2011)*

Vikhlyaev A. (2004), *Environmental Goods and Services: Defining Negotiations or Negotiating Definitions?* [in:] *Trade and Environment Review 2003*, United Nations, New York, Geneva, article 2

Wysokińska Z (2005), *Foreign Trade in Environmental Products; The WTO Regulation and Environmental Programs*, *'Global Economy Journal*', Volume 5, Issue 3, Article 5, US 2005, http://www.bepress.com/gej/vol5/iss3/5

Wysokińska Z. (2009), *The International Environmental Goods and Services Market: An Opportunity for Poland*, 'Polish Journal of Environmental Studies', Vol. 18. No 5, pp. 941–948, 953-954

Wysokińska Z,. Witkowska J. (2005), *International Business and Environmental Issues - Some Empirical Evidence from Transition Economies*, 'Polish Journal of Environmental Studies', Vol. 14 No. 3, pp. 269-279

Wysokinska Z., Witkowska J. (2004), *Trade and Foreign Investment and Sustainable Development*, University of Lodz Publishing House, Lodz, pp. 204-185

Wysokińska Z. (2008), *Ocena szans Polski na międzynarodowym rynku wyrobów i usług środowiskowych (Last Chance for Poland on the International Market for Environmental Goods and Services)*, ekspertyza dla Departamentu Rozwoju Gospodarki, Warszawa, (Expertise for the Department of Economic Development, Warsaw)

## Streszczenie

### PRZEJŚCIE DO ZIELONEJ GOSPODARKI-W KONTEKŚCIE WYMOGÓW EUROPEJSKICH I GLOBALNYCH UKIERUNKOWANYCH NA ZRÓWNOWAŻONY ROZWÓJ

*Celem artykułu jest przedstawienie wybranych aspektów zrównoważonego rozwoju w odniesieniu do ochrony środowiska i budowy "zielonej gospodarki" w kontekście uwarunkowań globalnych i europejskich dla rozwoju rynku towarów i usług środowiskowych (szczególną uwagę poświęcono w nim krajom Europy Środkowej i Wschodniej). Jednym z najbardziej istotnych aspektów jest również promowanie czystego wzrostu ekonomicznego w celu wzmocnienia przechodzenia do bardziej zrównoważonej i bardziej zielonej gospodarki w sektorze energetycznym, przez wdrażanie redukcji emisji gazów cieplarnianych i tlenków siarki oraz przez rozwój energetyki bazującej na odnawialnych nośnikach energii. Pewne osiągnięcia w tej dziedzinie zostały zaprezentowane w niniejszym artykule.*