GROWTH RESOURCE EFFICIENCY AND REBOUND EFFECT ENVIRONMENTAL

Dumitru Şoaita
Petru Maior University of Tg. Mureş,
dsoaita@engineering.upm.ro

ABSTRACT

This paper highlights the need to decouple resource use from economic growth and the need to change the traditional patterns of production and consumption in order to reduce the pressure on the environment by increasing the efficiency of resource use. There are also presented some environmental rebound effects of improving resource efficiency, some economic sectors where resource efficiency is canceled by the increased demand.

Keywords: resource, efficiency, decoupling, environment, rebound effects

1. Introduction

Up to two centuries ago the environment has not suffered greatly because of human intervention, excepting limited areas, but the industrial revolution and especially the new scientific discoveries increased the power of influence of man over nature.

In the last decades human civilization interventions environment caused greater damage than the last millennium [1].

Under the impact of economic and social development soil, water and air have been polluted, many species of plants and animals have disappeared or are endangered, resources have depleted, and man is confronted with various diseases caused by pollution.

Pressure and changes facing the environment, including climate change, are not caused only by natural events, but also by the emergence of development models, practices and life styles of humans, as will be seen below.

2. Overexploitation of natural resources

In parallel with population increase human needs have grown and diversified. This has led to overexploitation of natural resources with consequences of drastic reduction of resources available per capita, which currently fall on average by 2% per year [8].

The graph in Figure 1 comes to reinforce the statements above, showing the evolution of extracting enormous quantities of natural resources per capita, broken down into categories and some regions, namely Central and Southeast Europe.

Worldwide, the amount of raw mineral materials extracted, processed and used reaches 28 billion tons annually. To achieve this quantity of raw mineral materials, 60 billion tons of mining mass need to be extracted. Total mining and vehicle mass extracted by mining is four times greater than the amount carried by rivers of the world in the seas and oceans [2].

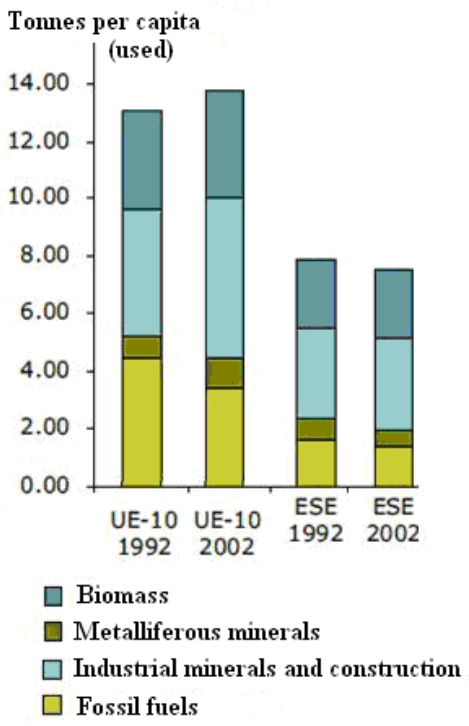

Fig. 1 - Evolution in the use of resources [9]

Traditional patterns of economic and industrial development is characterized by the increase in natural resources consume that generates more pollution (Fig.2).

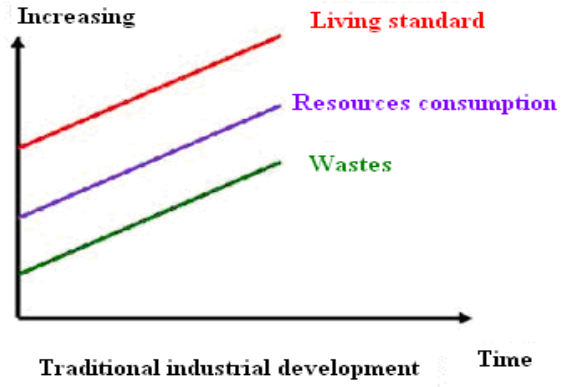

Fig. 2 - Traditional pattern of industrial development [3]

The issue of resource use, sustainable consumption and production first appeared in world policy program at the NU Conference on Environment and Development (Rio de Janeiro, 1992), where was noted that "the continued deterioration of global environment is caused by deficient model of consumption and production, particularly in industrialized countries", model considered as "non-sustainable".

3. The concept of sustainable consumption and production, efficient use of resources

Increased production and consumption has an important impact on the environment. For all countries, the issue consists in breaking the relationship between economic growth and environmental impact as a result of consumption, resource use and waste production. Unlike traditional patterns of economic and industrial, consuming more natural resources and generating greater pollution,

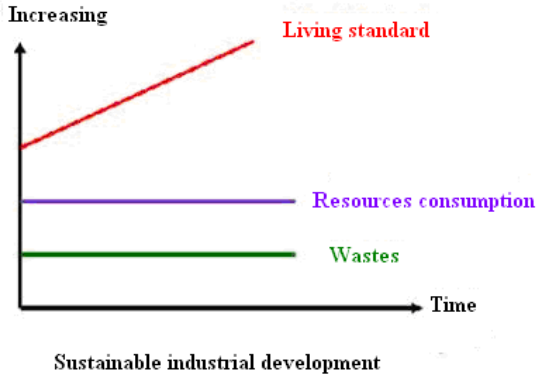

Fig. 3 – Pattern for sustainable industrial development [3]

the implementation of the sustainable production and consumption patterns favor the optimal use of resources and reduce waste production, without affecting the standard of living (Fig.3).

Promoting sustainable production-consumption systems requires: continuous enforcing of integrated pollution prevention, applied to processes, products and services in order to increase eco-efficiency and reduce risk for human health and the environment.

Similar to the definition of sustainable development, sustainable consumption and production are aimed to maximize efficiency and effectiveness of products, services and investments, in order to meet society's needs without jeopardizing the ability of future generations to meet their needs.

Production and consumption are, without doubt, the components of the economy with the greatest impact on the environment. This impact is particularly important and at the same time has a great potential for environmental protection when the chosen methods of production are "clean" or are used those products less harmful, by composition or post-consumer waste generated.

Decoupling resource use from economic growth cannot be achieved without identifying economic sectors, products and resources that have great environmental impact and without careful consideration of efficient use of resources and a structural change in the economy.

Currently, there are few reliable methods widely accepted for measuring the environmental impact of production activities and resource use. Although the amount of pollutants emitted or the amount of waste generated can be measured their impact (in terms of human health, eco-toxicology, biodiversity loss etc.) is still almost impossible to calculate with precision.

There are very different patterns of resource use from one region to another and from one country to another. Differences between countries are even higher in terms of effectiveness / efficiency in using their resources.

However, comparison of economic activities (eg, GDP, gross value added) to the amount of

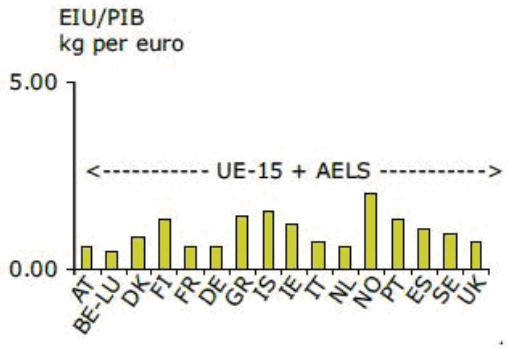

Fig. 4 - Resource efficiency in UE 15+AELS [8]

resources used or the amount of pollution

emitted allows highlighting areas of inefficiency and excess, together with their negative impact on the environment.

Resource efficiency is given by the ratio of domestic extraction used to the gross domestic product. The most efficient use of resources, with a median of about 0.8kg / euro, is recorded in the EU15 (Fig. 4).

Efficiency is lower (2.9 kg/ euro) in the EU 10, where there are large differences between member states. Thus, the economies of the three Baltic States, as in the Czech and Polish economy, there is a much more intensive use of resources than the rest of the group (Fig. 5).

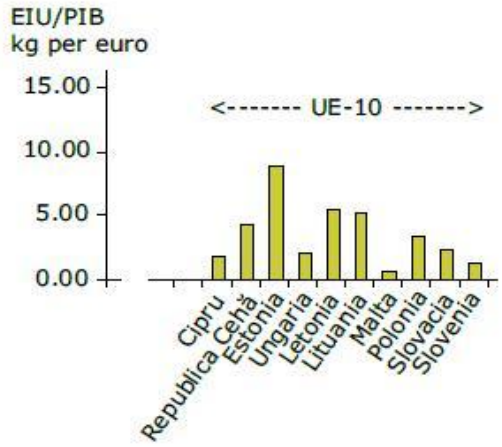

Fig. 5 - Resource efficiency in UE 10 [8]

By far the largest consumer of resources in relation to GDP was recorded in EECCA, where the median is 17.1 kg / euro. But the situation in this group is very different from one country to another, where values range from 3 kg per GDP in Georgia EIU to 26 kg in Kyrgyzstan (Fig.6).

In SEE economies, resource efficiency is even lower, reaching a median intensity of 5.6 kg / euro (Fig.7).

Overall, the average efficiency of resource use in the EU15 is up to 20 times higher than in EECCA. Even taking into account differences in climate, geography and economic structure of countries, there is a large potential to increase energy and materials efficiency in the region.

Although more efficient use of EU 15 and energy resources, its ecological footprint was significantly higher than that of other regions and over two times higher than the "sustainable". EU-10 and SEE also operated at levels "unsustainable", although to a lesser extent.

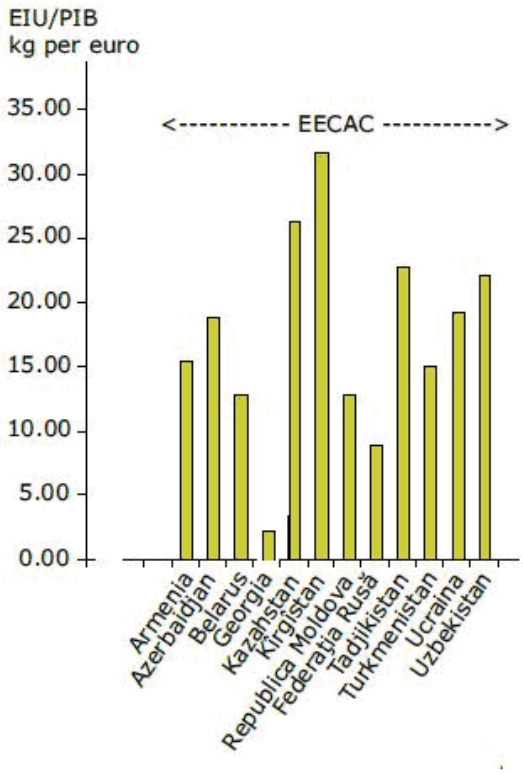

Fig. 6 - Resource efficiency in EECAC [8]

EECCA region due to large areas of land and high biocapacity available was only one where the use of resources not involved an "ecological deficit".

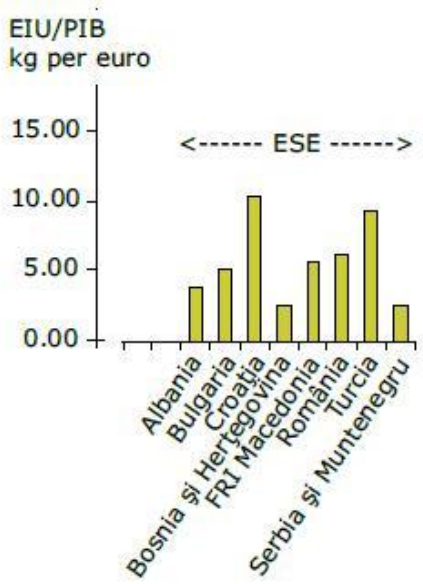

Fig. 7 - Resource efficiency in ESE [8]

4. Rebound effect of improving the efficient use of resources

There are sectors where efficiency of resource use was canceled by increased demand. For example, space heating accounts for 70% of domestic consumption of energy in the EU25, and water heating 14% (Eurostat, 2007).

Ratios, as estimated, are similar in EECCA and SEE. The EVC warming is one of the sectors where consumption efficiency was canceled abundantly by demand.

In most Member States of EU 15 household's efficiency in heating increased in the past 15 years, mainly due to better insulation and preventing heat loss.

This improvement was however offset, and overcome the negative effect of increasing the number of dwellings, the housing surface and average temperature of the room.

Despite improvements in energy efficiency, total domestic consumption of energy continues to grow in the EU, partly due to recoil effects (behavior changes due to improvement of technology efficiency and lower prices). In the UK, for example, building insulation standards have improved considerably, but at the same time, better insulation and better heating equipment allowed residents to warm up to higher temperatures their rooms than they really need.

The average temperature in the home (including unheated rooms) increased from an estimated temperature of 16 ° C in 1990 to 19 ° C in 2004, thus nullifying the energy savings achieved by improving the thermal efficiency.

Another significant example is the boomerang effects of individual electronic devices that have been miniaturized and became cheaper to produce using fewer resources. Thus, with many smaller electrical and electronic devices, environmental impact does not come so much from their use, but from removal from service, given their high content of heavy metals and other hazardous substances. Currently, this category of waste is one of the fastest growing in the EU.

The amount of electrical and electronic goods to be removed depends on the degree of possession of such devices among the population and the rate at which owners are replacing them.

Currently, the replacement rate is determined by the fashion and technical progress more than the useful life of the device. Mobile phones and computers are goods that their consumption is determined by production. EU residents change their phones every 25 months, the replacement rate decreased to only 20 months among young people [6].

Indicators sustainability are essential in illustrating to policymakers and the public alike the relationship and trade-offs among the three dimensions of sustainable development. It is also crucial in monitoring progress and performance in terms of achieving economic, social and ecological goals over time, and in evaluating the future implications of existing decision and policy direction.

5. Conclusions

To overcome the current crisis between man and the environment, many researches in the field suggest the transition of humanity to economic behavior and lifestyle ecologically acceptable, for the purposes of achieving a sustainable socioeconomic system based on compatibility of natural environment and that created by the man, which meets long-term human society.

There is already a wide range of tools developed in the world and especially EU, in order to promote industrial practices with low environmental impact and influence our choice of products, so that variants preferred to be "environmentally friendly". Although the amount of pollutants emitted or the amount of waste generated by a particular pattern of consumption and production their impact (in terms of human health, eco-toxicology, biodiversity loss etc.) is still almost impossible to calculate with precision.

Despite the "sustainable development" and neoliberal offensive mondialism, global environmental problems are a reality, and settle them a priority. Looking for a way out realities pressing issue is ideas, theses and up to concepts, some accompanied by adequate projects.

Romania is still in its beginning in this regard, and if not has the best techniques in the field, has the advantage that may benefit from earlier experiences of the member states EU and thus to learn good practices and avoid the mistakes made in the past.

References

[1] Choucri, N. - *Sustainable Development – Theory and Policy*, MIT Press, Boston, Massachussetts, USA, 2006;

[2] Rojanschi, V. Bran, FI., Diaconu, Gh. - *Protecţia şi ingineria mediului*, Editura Economică, Bucureşti, 2002;

[3] Şoaita D. - *Bazele dezvoltării durabile*, Editura "Universităţii Petru Maior", Tg. Mureş, 2010

[4] *** - *EU Sustainable Development Strategy Brussels*, 2006;

[5] *** - *Strategia Nationala pentru Dezvoltare Durabila la orizontul anilor 2013-2020-2030*, Guvernul României, 2008;

[6]*** - *Indicators of Sustainable Development: Guidelines and Methodologies, 2009*,
http://www.un.org/esa/sustdev/natlinfo;

[7] *** - *United Nation Environment Programme, Division of Technology, Industry and Economics*, http://www.uneptie.org;

[8]*** - *Sustainable consumption and production, Resource productivity*, http://epp.eurostat.ec. europa.eu/ portal/page/ portal/sdi/indicators;

[9] *** *EU Sustainable Development Indicators (EU SDIs)* to the Eurostat SDI team through estat-sdi@ec.europa.eu.