OBJECTIVES AND TRENDS OF A RESOURCE-EFFICIENT ECONOMY IN EUROPEAN UNION AND IN ROMANIA

FRONE SIMONA
Senior Researcher II/PhD,
INSTITUTE OF NATIONAL ECONOMY, BUCHAREST, ROMANIA
e-mail: frone.simona@gmail.com

CONSTANTINESCU ANDREEA
Scientific Researcher III/PhD. Student,
INSTITUTE OF NATIONAL ECONOMY, BUCHAREST, ROMANIA
e-mail: andreea_constantinescu07@yahoo.com

Abstract
A key objective of the National Strategy for Sustainable Development of Romania is the eco-efficient management of resource consumption to maximize outputs, by promoting a model of production and consumption allowing for long-term sustainable economic growth and convergence to the average performance of EU states in resource productivity. In this paper, we aim to emphasize and analyze the importance of the new concepts and policies called for implementing the SDS in the EU and in Romania and also for transition to a green economy. We shall explain more in detail the significance and relationships between the main features of sustainable development, focusing on the concept of resource efficiency, with its lead indicator resource productivity, offering a way to measure progress towards a 'green economy'.
The time-series data computations and analysis show that the evolution of the Romanian economy in recent years has been inconsistent with the principles of sustainable development model and the gap towards the EU-27 average level of resource efficiency (productivity) has widened, in recent years. As such, the continuation of this trend in the Romanian economy may threaten the sustainability of economic growth in the long term, due to excessive and irrational resource consumption, with negative consequences for the state of natural capital, but also for the desired resource-efficient economic and social development.
Some suggestions, conclusions and policy recommendations are made in the end, in order to eventually restructure and reshape the Romanian industry so as to improve the performance of resource-efficiency and productivity, to advance towards a greener economy and an information society.

Keywords: *sustainable economic growth, resource-efficient, resource productivity, green economy*

J.E.L. classification: *O44, O47, Q32*

1. Introduction

Addressing social and economic development within the carrying capacity of ecosystems and decoupling economic growth from environmental degradation is an essential requirement for sustainable development.

Therefore, the European Union Sustainable Development Strategy (EU SDS) and the National Sustainable Development Strategy (NSDS) of Romania have set the objective of promoting sustainable consumption and production patterns. Moreover, at present, a resource-efficient economy is required in Europe. The Europe 2020 Strategy and its flagship initiative on "A Resource Efficient Europe" set the EU on the path to a systemic transformation.

In the paper, we aim to emphasize and analyze the importance of the new concepts and policies called for implementing the SDS in the EU and in Romania and also for transition to a resource-efficient, green and circular economy.

We shall explain more in detail the significance and relationships between the main features of sustainable economic growth, focusing on the concept of resource efficiency, with its lead indicator resource productivity, offering a way to measure progress towards the objectives of a 'green economy'.

2. **Conceptual and methodological aspects**

The environment and natural resources underpin both our economy and our quality of life. To secure sustainable economic growth and jobs, all the strategic approaches of development should ensure first that these increasingly scarce and expensive natural resources still circulate and create value in the economy [1].

Consequently, the ways of achieving sustainable development by carrying out a sustainable economic growth are not confined to reducing pollution, but also require structural changes in industrial processes and in manufactured products, as well as in the type and amount of resources used. Creating a more energy and resource-efficient society that uses resources responsibly and organizes industrial processes as to minimize waste should reflect objectives of sustainable economic development in all major areas**.**

The concept "resource efficiency" means using the Earth's limited resources in a sustainable manner, while minimizing impacts on the environment. It allows us to create more with less and to deliver greater value with less input.

At the most basic level, resource efficiency captures the notion of 'doing more with less' in the way it expresses the relationship of society's demands on nature (in terms of resource extraction, pollutant emissions and ecosystem pressures more broadly) to the returns generated (such as economic output or improved living standards). The transition to a low-carbon economy is also one particularly important aspect of the broader goal of reducing the environmental burden of society's resource use [2].

The resource-efficient economy is, in our opinion, very close or may be considered a "proxy" to ideal concepts like the 'green economy' or a 'circular economy'. Both of these concepts promote a systemic transformation in the way resources flow through the economy and society.

Practically speaking, a green economy is one whose growth in income and employment is driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services.

The UNEP has developed a working definition of a green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive [3].

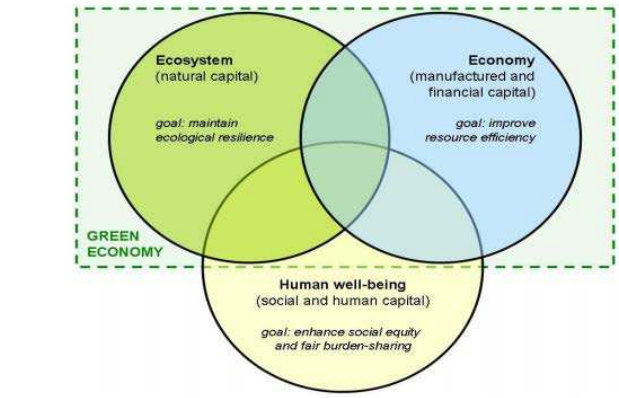

Figure 1 Main features of a sustainable economic development as transition to a green economy
Source: European Environment Agency

When we consider sustainable development as a way towards a green economy, we may observe, as represented in Figure 1, the most important three pillars and their specific goals and objectives:

- the Ecosystem pillar: a specific objective of sustainability is to maintain the ecological resilience;
- the Economy pillar: a specific objective of sustainable economic development is to improve resource efficiency;
- the Human well-being pillar: specific goal of sustainability is to enhance social-equity and a fair burden-sharing.

Whatever the angle of approach and the effects pursued in the content of each operating concept of the green economy, they underlines the importance of integrating economic and environmental policies in a way able to highlight opportunities for sustainable economic growth, avoiding depletion of qualitative and quantitative natural resources [4].

Decoupling growth from resource use and unlocking new sources of sustainable growth needs therefore coherence and integration in the policies that shape our economy and our lifestyles. A revamping of the economy to

become resource-efficient is a necessary, but still not sufficient condition to achieve transition towards the green economy.

Still synergic related to a resource-efficient economy, but even more demanding is the concept and model of circular economy**.** The strategic approach "Towards a Circular Economy" further promotes a fundamental transition in the EU, away from a linear economy for resources to be not simply extracted, used and thrown away, but put back in the loop so they can stay in use for longer. This approach also sets out measures driving a more efficient use of resources and waste minimization. It is therefore considered that moving towards a more circular economy is essential to deliver the resource efficiency agenda established under the Europe 2020 Strategy for smart, sustainable and inclusive growth[1].

Higher and sustained improvements of resource efficiency performance are within reach and can bring major economic benefits. This way all the strategies for sustainable development should be efficiently and effectively underpinned [5].

3. Objectives and trends of a resource-efficient economy in the EU and in Romania

We have analyzed and concluded that the concept of resource-efficiency underpins all the valuable ideal concepts of economy and development: sustainable development, the green economy and the circular economy.

This is the reason why, as we shall see further, increasing the resource-efficiency of all the economic activities in the EU represents a key objective in all the strategic documents addressing medium and long-term economic growth.

In practice, this requires that the stocks of all environmental assets from which the EU benefits or sources its global supplies are secure and managed within their maximum sustainable yields. The Resource-efficient Europe flagship initiative under the Europe 2020 Strategy [1] promotes the integration of resource efficiency in economic, energy, transport, construction, agriculture, fisheries and cohesion policies.

The importance of the shift towards a resource-efficient and low-carbon economy in the EU may be emphasized by highlighting its advantages, since this process of sustainable production and consumption is meant to contribute to:

- boosting economic performance while reducing resource use;
- ensuring security of supply of essential resources;
- addressing climate change and limiting the environmental impacts of resource use;
- creating new opportunities for economic growth and greater innovation;
- increasing the EU's competitiveness.

A Roadmap to a Resource-efficient Europe [6] defined medium and long term objectives and the means needed for achieving them. The Roadmap (COM/2011/0571 final) should also be seen in the context of worldwide efforts to achieve a transition towards a green economy. The main challenges and actual resource and energy constraints are at present more and more significant.

As stated in the Roadmap to a resource efficient Europe, in the EU, each person consumes 16 tons of materials annually, of which 6 tons are wasted, with half going to landfill. Trends show, however, that the era of plentiful and cheap resources is over. Businesses are facing rising costs for essential raw materials and minerals, their scarcity and price volatility are having a damaging effect on the economy.

Sources of minerals, metals and energy, as well as stocks of fish, timber, water, fertile soils, clean air, biomass, biodiversity are all under pressure, as is the stability of the climate system. Whilst demand for food, feed and fiber may increase by 70% by 2050, 60% of the world's major ecosystems that help produce these resources have already been degraded or are used unsustainably. If we carry on using resources at the current rate, by 2050 we will need, on aggregate, the equivalent of more than two planets to sustain us, and the aspirations of many for a better quality of life will not be achieved [6].

Therefore, in order to prevent this unsustainable scenario, we shall need a new focus on resource efficiency and measure progress towards a resource-efficient economy more carefully and pro-actively.

There may be many economic, ecologic and social benefits of restructuring and turning the economy and industry into a resource-efficient path, since this will bring increased competitiveness, new sources of growth and jobs through cost savings from improved efficiency, commercialization of innovations and better management of resources over their whole life cycle.

However, this transformation requires ambitious targets and implementing policies that recognize the interdependencies between the economy, wellbeing and natural capital and seek to remove barriers to improved resource efficiency, whilst providing a fair, flexible, predictable and coherent basis for business to operate.

Although some key benchmarks are already provided in the Europe 2020 headline targets of 20% greenhouse gas emission reduction (30% if the conditions are right), 20% renewable energy sources, and 20% improvement in energy efficiency, the EU needs more tools to monitor and measure progress on resource efficiency, as stated in the flagship initiative **A resource-efficient Europe** (COM 21/2011) [1].

[1] COM(2010) 2020, COM(2011) 21.

Moreover, it is important that governance and monitoring of progress will take place in the framework of the Europe 2020 strategy and will integrate the relevant elements of the EU Sustainable Development Strategy in order to ensure overall coherence.

The Roadmap (COM/2011/0571 final) proposed a new pathway to action on resource efficiency, with a process involving all key stakeholders, to discuss and agree on indicators and targets. However, measuring resource efficiency is a statistical challenge. Robust and easily understandable indicators will be necessary to provide signals and measure progress in improving resource efficiency [6].

To launch this process of monitoring and governance of progress in resource, two levels of indicators were provisionally formulated:

1) the provisional lead indicator - "Resource Productivity" - to measure the principal objective of improving economic performance while reducing pressure on natural resources;
2) a series of complementary indicators on key natural resources such as water, land, materials and carbon, that will take account of the EU's global consumption of these resources.

Recognizing the need to start measuring progress immediately, the Commission proposes using, as a provisional lead indicator, resource productivity (RP), measured by the ratio of GDP to Domestic Material Consumption (expressed in €/tone). A higher ratio would indicate better performance, with growth consuming relatively fewer resources. This, however, only captures the material resources aspects and does not deal with other resources or the potential shift of burden across countries.

Also in the National Sustainable Development Strategy Romania 2013-2020-2030 it was stated as an important Horizon 2013 National Objective: to achieve eco-efficient management of resource consumption and to maximize resource productivity by promoting a pattern of consumption and production that makes sustainable economic growth possible and brings Romania gradually closer to the average performance of the other EU countries [7].

By applying some specific theoretical-methodological relations of the main indicators (GDP, Resource productivity-further here referred to as RP), we may analyze whether in the last years (since 2000) sustainability and resource-efficiency criteria have been met in economic development. In the tables and graphs presented further in the paper, we shall try to compare the level and evolution of some key statistical indicators, in Romania and in EU-27, to enable us to check the main trends as well as whether these trends may be considered consistent with the principles of a sustainable consumption and production.

For the EU, the evolution of RP (the resource-efficiency lead indicator) seems to have been apparently good, in the last years. Thus, in contrast to the decline in material consumption, EU-28 GDP grew by 16% between 2000 and 2012. As a result, EU-28 resource productivity (GDP/DMC) increased by 29%, from 1.34 €/kg of resources used in 2000 to 1.73 €/kg in 2012. However, despite recent improvements in resource productivity, European consumption patterns remain resource intensive by global standards [2].

On the other hand, the latest Eurostat data show that Romania has a productivity of resources equal to 33% of the European average. The Romanian economy consumes 59% more raw materials than in other European countries, and this, together with the fact that labor productivity and capital are low in our country, puts us in the last position in the top of resource efficiency [8].

In order to check the validity of this status and the evolution of the resource-efficiency level in Romania, as expressed in the lead-indicator Resource Productivity (RP), we have made some own data-analysis and computations.

In this respect, our time-series computations and analysis, based on data on Resource Productivity RP from the National System of Sustainable Development Indicators of the Romanian National Institute of Statistics (in table 1, figure 2) and that in (table 2, figure 3) based on Eurostat data (for EU comparability, RP is expressed in PPS/kg) show that the evolution of the Romanian economy in recent years has been indeed inconsistent with the principles of sustainable development model and with the objectives of increasing resource productivity stated by the NSDS.

Table 1 Evolution and trends of the RP in Romania, 2000-2012
(Thousand lei/t, 2005 prices)

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
RP (thousand lei/t, 2005 year prices)	1,27	0,85	0,93	0,90	0,91	0,87	0,87
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
RP (thousand lei/t, 2005 prices)	0,78	0,66	0,78	0,84	0,75	0,78	n/a

Source: NIS, System of Sustainable Development Indicators, Objective no 4. Sustainable production and consumption OP1_Resource productivity.

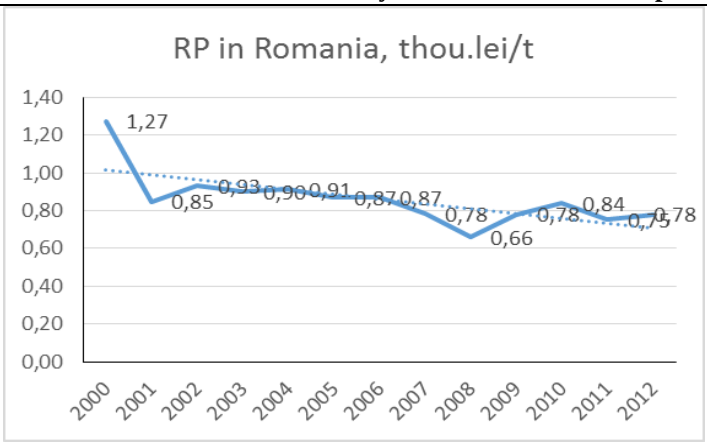

Figure 2 Resource productivity evolution and trend in Romania, 2000-2012
(Thousand lei/t, 2005 prices)

It can be seen that over the period 2000-2012, the evolution in Romania of the RP indicator development was quite significant and the overall trend is undoubtedly downward.

Therefore, as shown in the table and the chart below (Table 2 and Figure 3, computed with data from Eurostat), because of the fact that this downward RP trend in Romania was registered simultaneously with an upward trend of the RP in the EU27, in 2000-2007, the resource productivity gap in Romania compared to the EU average has increased.

Table 2 Evolution and trends of the RP in EU and in Romania, 2000-2013
(Purchasing Power Standard per Kilogram)

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
RP EU (27 countries)	1,22	1,27	1,33	1,36	1,36	1,4	1,45
RP Romania	0,64	0,45	0,5	0,49	0,52	0,51	0,54
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
RP EU (27 countries)	1,51	1,54	1,64	1,76	1,75	1,91	1,96
RP Romania	0,52	0,46	0,55	0,63	0,58	0,63	0,61

Source: Eurostat, Resource productivity [env_ac_rp], extracted: 18.03.2015.

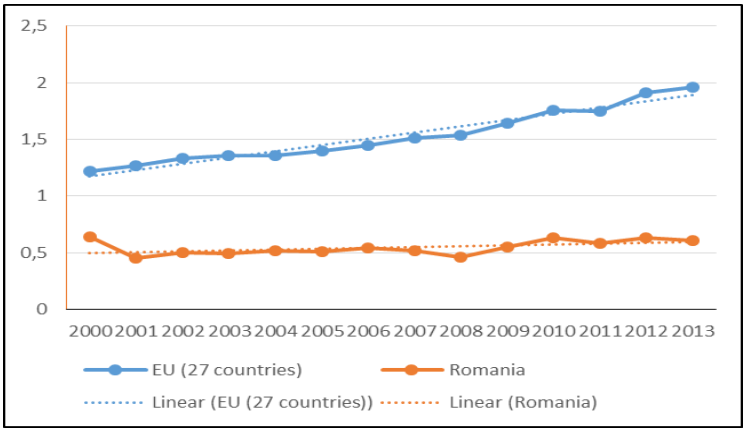

Figure 3 Evolution and trends of the RP in EU and in Romania, 2000-2013
(Purchasing Power Standard per Kilogram)

Although when expressed in PPS/kg, the RP level in Romania was quite stable in the 2000-2013 period (Figure 3), the gap towards the EU-27 average level of resource productivity has widened in recent years, since the economic recession may have brought, in EU and Romania as well, some negative economic issues but also some positive effects or opportunities of cutting resource-intensive production.

As such, the continuation of this trend in Romania may threaten the sustainability of economic growth in the long term, due to excessive and irrational resource consumption, with negative consequences for the state of natural capital, but also for the desired resource-efficient economic and social development.

It is also important to signal that so far we have not managed to get closer to the goal of National Sustainable Development Strategy Horizon 2020: reaching the current average level of EU countries, for the main indicators of sustainable development.

4. Conclusions and recommendations

As a main principle of the current strategies of sustainable and resource-efficient economic development strategies of the European Union, focusing on resource efficiency in policy making is both a necessity and an opportunity for the EU. Hence, a resource efficient economic development is also the route to this vision of a future green and circular economy in the European Union (and in Romania), since:

- it allows the economy to create more with less, delivering greater value with less input;
- it involves using resources in a sustainable way and minimizing their impacts on the environment.

Using resources more efficiently should help the European Union and the EU member states (including Romania) achieve many of the strategic objectives, since this process will have a significant contribution to:

- making progress to deal with climate change;
- protect valuable ecological assets, the services they provide and the quality of life for present and future generations.

Transition will need a policy framework where innovation and resource efficiency are rewarded, creating economic opportunities and improved security of supply through product redesign, sustainable management of environmental resources, greater reuse, recycling and substitution of materials and resource savings.

It is now believed that the successful implementation of the EU strategic documents would need to establish more concrete targets and policies for increasing resource productivity RP at EU level. The objective should aim to ensure at least a doubling of resource productivity relative to pre-crisis trend [9].

Nevertheless, the projections of future trends (in the business as usual scenario) suggest that Resource Productivity will continue to increase in the EU, but at a slower rate than in the past. In this baseline projection, GDP is forecast to increase by around 30% between 2014 and 2030, and in the meanwhile Resource Productivity will have improved by around 15% by 2030 (by 7% by 2020) at a trend rate of 0.9% per annum) [9].

In Romania, the situation of the resource productivity indicator is more complicated since here we must reverse the recent downward trend of the RP.

In the NSDS, some preliminary estimation indicated that the application of adequate economic policy instruments could result in a 3-4% annual increase in physical and energy resource productivity during the period 2008-2013 mainly through [7]:

- macroeconomic structural adjustment (raising the service sector contribution to the GDP from 48.8 in 2005 to about 55% in 2013, 60-65% in 2020 and 70% in 2030) and intra-sectorial structural adjustment (lower share of energy and material-intensive sub-sectors in industry)
- a 2-3% annual increase of the share of products having high value added and relying on medium-grade and high technology, and also of the share of services in the structure of exports;
- significant improvement in the technological content and the quality of products and services leading to better performance on the market and higher value added in relation to the cost of resources actually used.

However, these optimistic scenarios seems to not have come truth in reality, and the overall resource productivity in Romania has remained low, and has even decreased as compared to the pre-accession level (in 2012 as compared to 2006, see Figure 2). The trend had as negative effect the increase, instead of a decrease in the gap towards the EU-27 average level of resource productivity (Figure 3).

Our future research will analyze more deeply the evolution and the factors of the RP in Romania, in order to see what might have been some negative but also some positive impacts of the recent economic downturn (2008-2011) on the structure and the resource efficiency of our national economy.

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