



New Eastern EU Member States: Decoupling of Environmental Impact from Fast Economy Growth

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Regarding fast economy growth in New Eastern EU members, decoupling of environmental impact from economy growth is considered as the most important task from the point of sustainability. For the deeper analysis of development trends, the course of double decoupling, i.e., decoupling of use of natural resources (energy) from economic growth (primary decoupling) and decoupling of environmental pollution from the use of natural resources (secondary decoupling) is examined. Rather considerable (1,5 -2,5 times) reduction of energy intensity is characteristic for most investigated countries, except Slovenia during the period of 1991 – 2002. However, energy intensity in most countries remains essentially (1,2 -1,7 times) higher than in EU₁₅. Reduction of pollution intensity (amount of emitted acidifying compounds per unit of consumed energy) was not so expressed during the studied period. Minimal reduction of pollution intensity was characteristic to the Baltic States. It consisted only 11 % in Lithuania, 12 % in Estonia and 37 % in Latvia during the investigated period. Pollution intensity was 1,3 - 2,7 times higher in New Member States than EU₁₅ average at the end of studied period (2002). Conclusion was made that to maintain further decoupling of environmental impact from economy growth, much more attention to the implementation of special environmental protection measures and reduction of pollution intensity (emissions of pollutants per unit of consumed energy) should be given in the nearest future.

Keywords: *New Member States, countries of transition economy, energy intensity, pollution intensity, double decoupling*

1. Introduction

The spring of 2004 has come to history of the European Union as an essential enlargement of the European Union and ten New Members have joined the EU after challenging accession period. Almost all New Member States, with exception of Malta and Cyprus, are the states of former Soviet block and usually are considered as countries of transition economy. These countries have undergone dramatic reforms over the last fifteen years. Changes in political system and transition from the centralized to a market economy caused an inevitable economical and social decline [1, 2]. Taking into account that Lithuania, Latvia, and Estonia were mostly integrated into general soviet economy, the most remarkable changes took place namely in these Baltic States [3 – 5].

Analyzing the experience of transition countries and possibilities of their further development is

necessary to take into account that these countries inherited extremely ineffective and resources consuming economy, however, they inherited sufficiently high level of people education, rather well developed, thought not very modern, energy supply and communication infrastructure as well [6, 7]. This human and economic potential creates good preconditions for sustainable development.

As it was noticed by some authors, economic and political liberalization may have both - positive and negative outcomes for sustainability of the New EU Member States. Despite improved efficiency, investments in cleaner technologies, refusing subsidies to heavy industries, market liberalization may end up in poor environmental control, exploitation of natural resources and shift to more pollution and resource - intensive industries [8]. Decoupling of environmental impact from economy

growth is one of the most important tasks from point of sustainability for countries of transition economy.

As it was pointed out in OECD report [9], despite several times higher pollution and resource intensities, the course of decoupling in the EU accession countries (New Member States currently) was named as positive because the amount of pollution declined faster (or grew slower) than economy (GDP); further pronounced decoupling is expected in New Member States [10]. Data on positive from the point of sustainability changes in the countries of transition economy were reported by several authors [5, 11, 12].

This article focuses on a comparative analysis of the main development trends of New Eastern EU Member States during 1991-2002 year period. The data sources and the methodology issues are described in the second section. The third section covers the analysis of changes in gross domestic product (GDP), final energy consumption, and emissions of acidifying substances. Changes in energy and pollution intensities are analyzed in the fourth section. The course of double decoupling, i.e. decoupling of use of natural resources from economic growth (primary decoupling) and decoupling of environmental pollution from the use of natural resources (secondary decoupling) is examined for the deeper analysis of development trends.

2. Data and method issues

Data of Eurostat and International Energy Agency are mainly used for this study [13 – 15]. Development of eight Central and East Europe countries, current New EU Member States: Czech Republic, Slovakia, Slovenia, Hungary, Poland, Latvia, Estonia, and Lithuania was analysed from the point of sustainability. Average data of EU₁₅ countries are used for comparison and interpretation of revealed trends.

The year 1991 has been chosen as a datum level and data of this year were equaled to 100% for the more evident time series analyses and comparison of the data. Energy intensity, i.e., final energy used per created GDP unit, is used as indicator of primary

decoupling and pollution intensity as indicator of secondary decoupling in this article. Pollution intensity usually is considered as amount of pollutants per unit of production [8, 16]. In this article pollution intensity is treated differently, i.e., as amount of pollutants per unit of used energy resources. Taking into account that measures and decisions needed to achieve primary and secondary decoupling are rather different, such treatment of pollution intensity seems to be more useful for analysis of reasons of revealed development trends.

GDP is presented in USA dollars, at constant 1995 prices, using purchasing power parities (PPP). Constant prices are used to compare real GDP over a period of years and to remove influence of inflation. PPP are used to remove effects of the different levels of prices within the group of countries at a single point of time.

Air pollution evaluation is based on the amount of acidifying pollutants, taking into consideration their acidifying potential (SO₂ 1/32, NO_x 1/46, NH₃ 1/17).

3. GDP, final energy consumption, and air pollution changes during 1991 – 2002

3.1. Economic changes

After the collapse of Soviet Union and the shift to the market economy, the countries of former Soviet block experienced either period of economy stagnations or deep transitional decline (Fig. 1). The economy of the Baltic States was directly integrated into the former Soviet Union and was most dependent on its resources. Cardinal change of economic relations from one side East orientation to balanced West – East cooperation resulted in deeper and longer economic decline than in the other countries under consideration. GDP decrease in the Baltic States continued till the 1994, when created GDP to compare to the end of the Soviet period (1991) dropped down by 29.9 % in Estonia, 40.5 % in Lithuania and 44.2 % in Latvia.

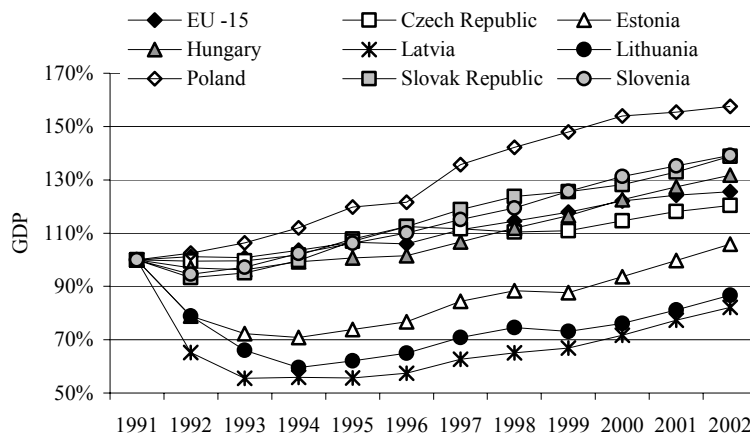


Fig 1. GDP (US \$ 1995 PPP) changes in New Eastern Europe Member States (1991=100 %)

Other countries of former Soviet block (not Soviet Union members) were much less integrated into former Soviet Union economy and experienced only very short-term transitional economy depression, which consisted only 2-5 % and continued only for 1-2 years (Fig. 1). Poland evaded economy depression at all. After temporal stagnation, quite fast economical growth (5 and more per cent increase of GDP annually) has started in these countries.

Recovery of the Baltic States economy has started only from 1995. Estonian economy grew up

fastest at this time and annual GDP increase has reached even 14 % in 1997. But the Russian economy crisis in 1999 has showed that the Baltic States were still much depended on Russian economy and decrease in the rate of economy growth was characteristic for all three Baltic States, however decrease of GDP was registered only in Lithuania. Rather fast growth of GDP (5-9 % annually) is typical for all three Baltic States from the year 2001, however only Estonia exceeded the 1991 GDP level in 2002 (Fig. 2).

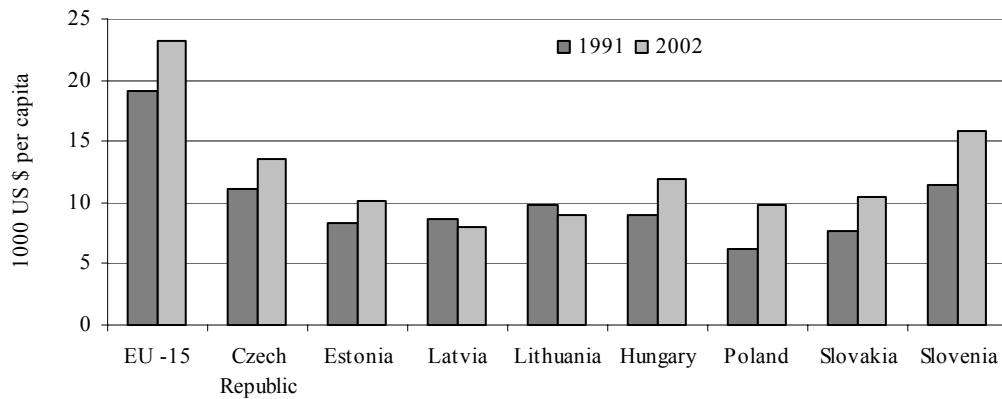


Fig. 2. Comparison of GDP per capita in different countries (1000 US \$ 1995 PPP/cap)

Despite rather fast economy growth in New EU Members, GDP created per capita in these countries is still much lower than in EU₁₅ countries on average (Fig. 2). For the year 2002 this indicator was lowest in Latvia and consisted 8.06 thousand USD (nearly 35 % of EU₁₅ average) and highest in Slovenia – 15.9 thousand USD (69 % of EU₁₅ average).

consumption is completely different from that for GDP. Despite rather fast growth of GDP, final energy consumption decreased in all countries under the study except Slovenia. This decrease consisted approximately 10 % in Poland and Hungary, approximately 20 % in Slovakia, and 30 % in Czech Republic during research period.

3.2. Final energy consumption

Trends of final energy consumption in different countries are presented in Fig 2. As it is seen from the presented data, pattern of changes in final energy

Much more essential reduction of final energy consumption was registered in the Baltic States. Despite some insignificant increase in final energy consumption during the last several years, final energy consumption has decreased by 62 % in Latvia, by 55 % in Estonia, and by 46 % in Lithuania during 1991 – 2002 years period.

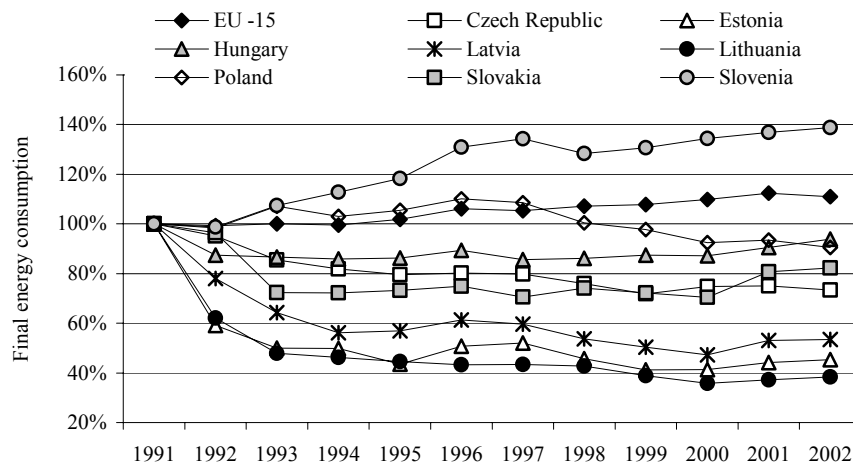


Fig. 3. Changes in final energy consumption (1991=100 %)

Energy consumption per capita was higher in most investigated countries than in EU₁₅ countries at the end of Soviet period (Fig. 4). The exception was only Poland, Hungary, and Slovenia. Especially high

final energy consumption per capita was characteristic for Estonia (over 3,6 toe) and Czech Republic (over 3,0 toe) to compare with 2,42 tons of oil equivalent in EU₁₅ in year 1991.

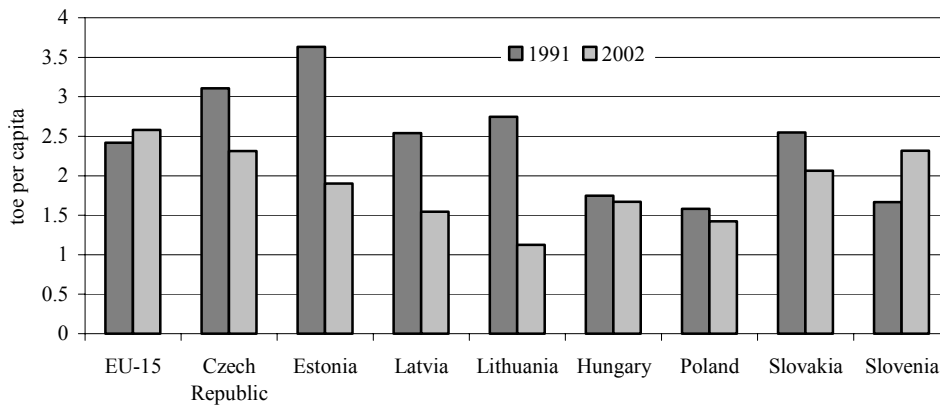


Fig 4. Comparison of final energy consumption per capita in different countries (toe/cap)

In all New Member States final energy consumption per capita is lower EU₁₅ level recently. While final energy consumption in EU₁₅ in 2002 year reached 2.6 toe/cap, in New Central and Eastern Member States it varied from 1,1 toe/cap in Lithuania to 2,3 toe/cap in Slovenia.

3.3. Changes in emissions of acidifying pollutants

Emissions of acidifying pollutants were reduced considerably in all examined countries during 1991 – 2002 year period (Fig. 5). Relatively smallest reduction of emissions was registered in Poland and

Slovenia, but even in these countries reduction of emissions from 1991 year level exceeded 40 % and approximately equaled to the reduction of acidifying emissions in EU₁₅ countries during the same period. The most considerable reduction of emissions was achieved in Czech Republic (approximately 4 times). Almost three times reduction of acidifying emissions took place in the Baltic States and Slovakia during the analysed period. It is necessary to note that emissions of acidifying pollutants were under decrease up to the end of investigated period in all countries except Lithuania where rather noticeable increase of emissions was recorded from the year 2001 and this negative trend is continuing.

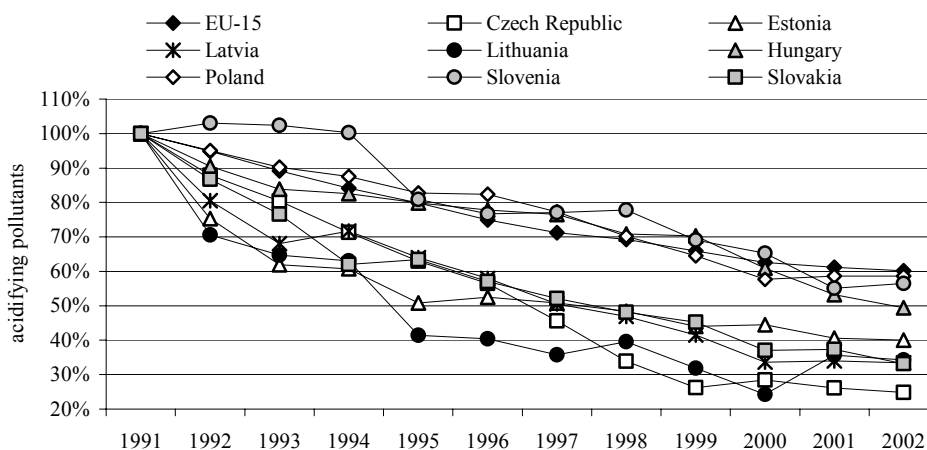


Fig 5. Changes in emissions of acidifying pollutants (1991=100 %)

Amount of acidifying compounds (weighted to their acidifying potential) emitted per square meters (km²) in different countries is compared in Fig 6. Analyzing this indicator, two groups of countries may be distinguished. In the first group of countries: Slovenia, Slovakia, Poland, and Hungary - emissions of acidifying compounds per km² were higher than in the EU₁₅ countries and exceeded 200 kg per km² in 2002. Despite considerable reduction of emissions

during the period under analysis (Fig. 6), Czech Republic depends to the same group as well. For the other group, i.e. for the Baltic States and Slovakia lower than in EU₁₅ countries emissions of acidifying compounds are characteristic. In Estonia and Lithuania this indicator stays approximately two times lower than in EU₁₅ countries (92 and 84 kg/km² respectively), and in Latvia it consists only 30 kg/km².

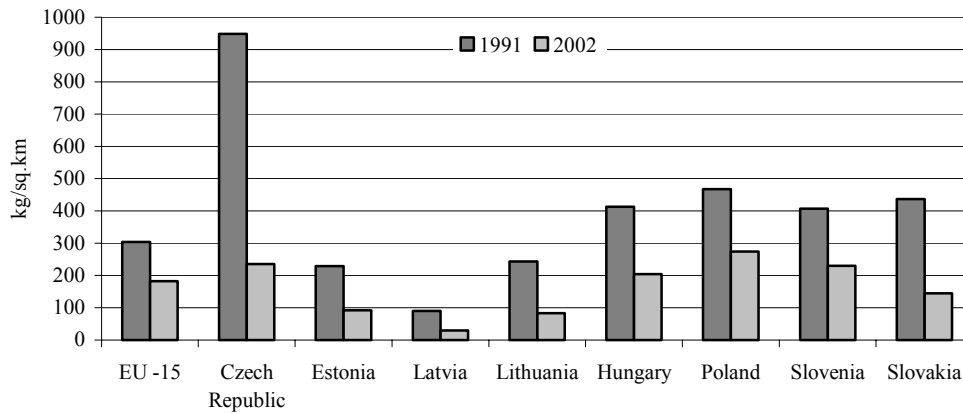


Fig 6. Comparison of emissions of acidifying pollutants per km² in different countries

4. Energy and pollution intensity

Changes in energy intensity expressed in tons of oil equivalent consumed per thousand USD of created GDP (constant 1995 prices, PPP) are presented in Fig 7. Rather considerable reduction in energy intensity was characteristic for most of New EU Member States during analysed period. Transition to the market economy, modernization of technologies as well as increased prices of energy resulted the increase of eco-efficiency of production and services and favourable from the point of sustainability

changes. It is necessary to mention that the most essential reduction in energy intensity was achieved in countries with the highest former (1991 year) energy intensity, i.e., Estonia, Slovakia, Latvia, Lithuania, and Czech Republic.

Despite the achieved progress, level of energy intensity in most studied countries remained essentially higher than in EU₁₅ countries. This difference consists approximately 1.7 times for Latvia, Estonia and Slovakia, 1.5 times for Czech Republic, 1.3 times for Poland and Slovenia, and 1.2 times for Hungary and Lithuania.

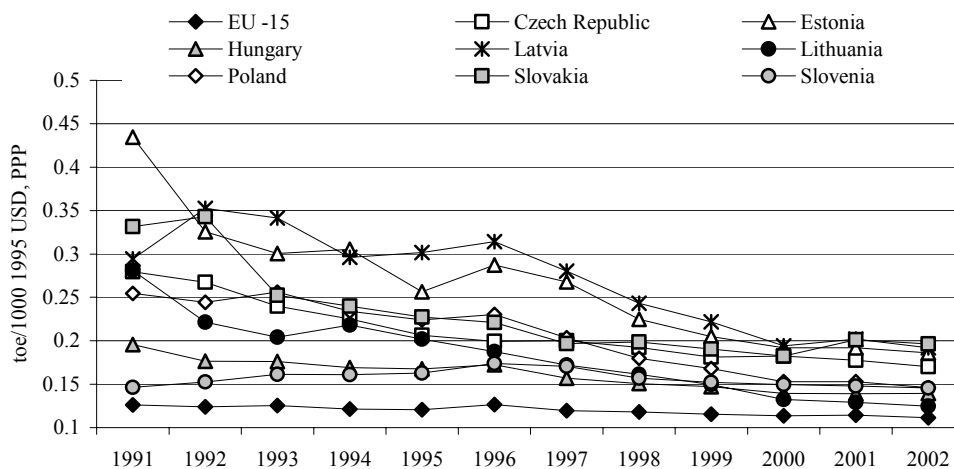


Fig 7. Changes in energy intensity (1991=100%)

As it was mentioned in the second section, pollution intensity is considered as the amount of pollutants per unit of final energy consumed, and air pollutants are presented regarding their acidification potential. Pollution intensity in different countries, expressed as amount of acidifying pollutants per consumed ton of oil equivalent, is compared in Fig 8. In all New Member States (except Latvia due to big share of hydro energy) pollution intensity was essentially higher than in EU₁₅ average (1,09 kg/toe) in 1991. The highest pollution intensity was observed in Slovakia, Poland, and Czech Republic where this indicator exceeded EU₁₅ average value 2,3, 2,2, and 2,1 times respectively. Pollution intensity was

approximately 1,5 - 1,6 times higher in Slovenia, Estonia, and Lithuania than in EU₁₅ countries.

Pollution intensity decreased essentially in most countries as well as in EU₁₅ countries during studied 12 years period. Implementation of different environmental pollution mitigation measures and shift to the less polluting fuel could be considered as the main reasons of such positive from the point of sustainability trends. Most pronounced reduction of pollution intensity took place in Czech Republic, Slovakia, Slovenia, and Hungary – 66, 60, 59, and 47 % respectively. Pollution intensity was reduced by 46 % during this period in EU₁₅ countries.

Minimal reduction of pollution intensity during investigated period took place in the Baltic States; in Lithuania it consisted only 11 %, in Estonia - 12 %, and in Latvia – 37 %. This phenomenon could be explained by the fact that namely transitional

economy depression in these countries was mostly pronounced and some environmental problems, including air pollution, were solved automatically almost without any special pollution mitigation measures.

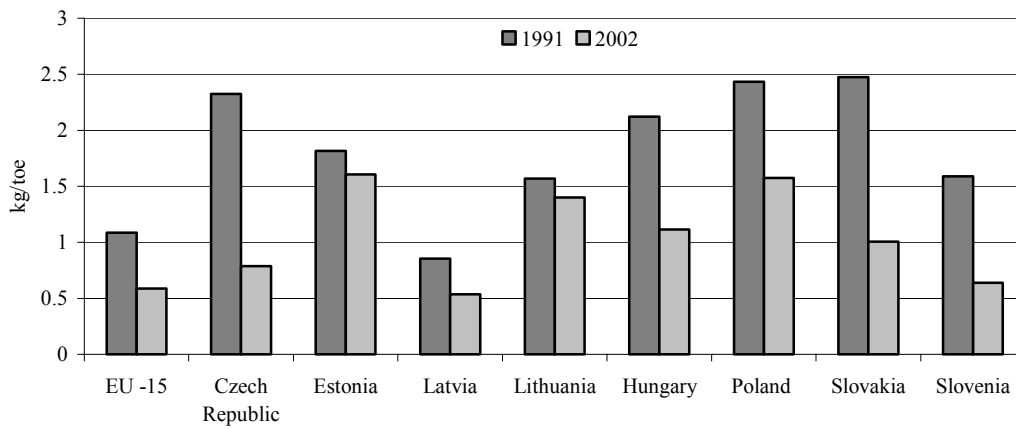


Fig 8. Comparison of pollution intensity in different countries

Despite significant achievements reducing pollution intensity in most analysed countries, for almost all New EU Member States (except Latvia) this indicator was 1,3 - 2,7 times higher than in EU₁₅ countries (0,59 kg of acid equivalent per toe) at the end of the period.

Decoupling of environmental impact from economy growth should be considered as one of the most important tasks from point of sustainability for New EU Member States, as it is expected to be by

EEA (2005). Indicators of energy intensity and pollution intensity are of particular importance to evaluate sustainability and reflect a level of dematerialization and a course of decoupling of natural (energy) resources use from economy growth (primary decoupling) and decoupling of environmental pollution from resources use (secondary decoupling). The course of primary and secondary decoupling in EU₁₅ countries and Lithuania is compared in Fig 9.

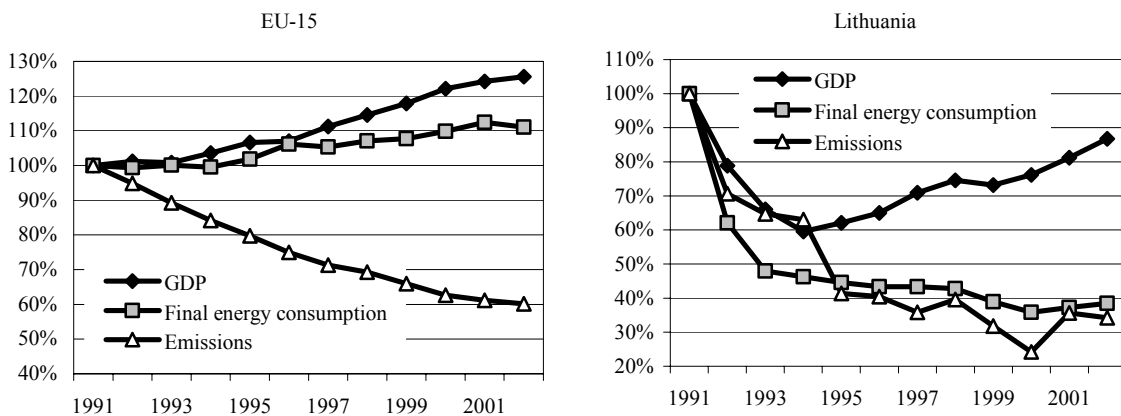


Fig 9. Comparison of primary and secondary decoupling courses in EU₁₅ and Lithuania (1991=100 %)

As it is seen from the presented data, proportions of primary and secondary decoupling in Lithuania is completely different from that in EU₁₅ countries. Secondary decoupling (reduction of emissions of pollutants per unit of consumed energy) is much more expressed than primary decoupling (reduction of energy consumption per unit of created GDP) in EU₁₅ countries. Contrary pattern is characteristic for

Lithuania's development - primary decoupling is very essential and energy intensity was reduced 2.25 times during the investigated period. At the same time, very weak secondary decoupling really started only from 1998 along with more wide use of natural gas in industry and energy sectors as well as liquid petroleum gas in transport and implementation of some environment protection tools [6, 8].

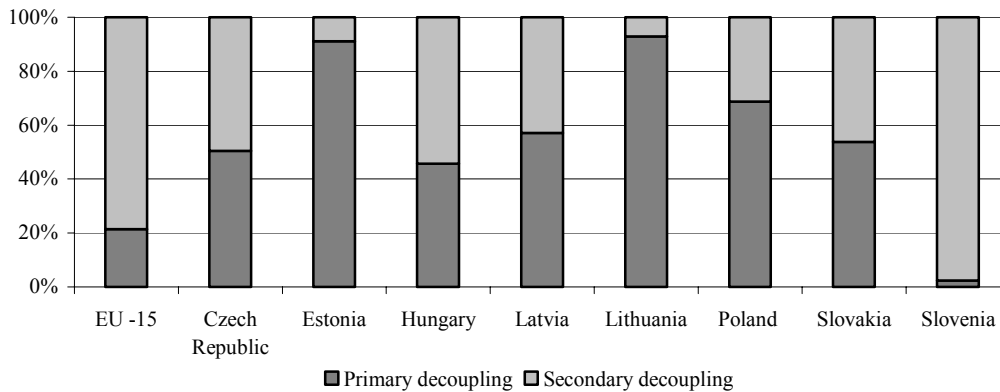


Fig 10. The share of primary and secondary decoupling in different countries

The contribution of primary and secondary decoupling to the general reduction of environmental impact in countries under analysis is presented in Fig 10. Rather small input of secondary decoupling to compare with EU₁₅ countries is characteristic almost for all investigated countries, with exception of Slovenia. The lowest share of secondary decoupling is characteristic for the Baltic States and especially for Lithuania and Estonia. In order to maintain further decoupling of environmental impact from economy growth, much more attention to the implementation of special environmental protection measures and reduction of pollution intensity (emissions of pollutants per unit of consumed energy) should be given in the nearest future.

5. Conclusions

1. Taking into account fast economy growth in New Eastern EU Members, decoupling of environmental impact from economy growth is the most important task from the point of sustainability. The course of double decoupling, i.e., decoupling of use of natural resources from economic growth (primary decoupling), and decoupling of environmental pollution from the use of natural resources (secondary decoupling) should be examined for the deeper analysis of development trends.
2. Despite rather fast economy growth in New EU Members (5-9 % annually), GDP created per capita is still much lower than EU₁₅ average in these countries. This indicator was lowest in Latvia (amounting nearly 35 % of EU₁₅ average) and highest in Slovenia (69 % of EU₁₅ average) in 2002.
3. Final energy consumption decreased in all countries under study except Slovenia. This decrease consisted approximately 10 % in Poland and Hungary, approximately 20 % in Slovakia, 30 % in Czech Republic, and approximately twice in the Baltic States during the period of 1991 – 2002.
4. Emissions of acidifying pollutants were reduced considerably in all examined countries. Relatively smallest reduction of emissions was

registered in Poland and Slovenia, but even in these countries reduction of emissions exceeded 40 % from 1991 year level. The most considerable reduction of emissions was achieved in Czech Republic (approximately 4 times). Almost three times reduction of acidifying emissions took place in the Baltic States and Slovakia during the period of analysis.

5. Rather considerable (1,5 -2,5 times) reduction of energy intensity is characteristic for most investigated countries, except Slovenia. However, level of energy intensity in most studied countries remained essentially higher than in EU₁₅. This difference consist approximately 1,7 times for Latvia, Estonia and Slovakia, 1,5 times for Czech Republic, 1,3 times for Poland and Slovenia, and 1,2 times for Hungary and Lithuania.
6. Reduction of pollution intensity was not so expressed during the investigated period. Minimal reduction of pollution intensity took place in the Baltic States during the investigated period. In Lithuania it amounted only 11 %, in Estonia - 12 %, and in Latvia – 37 %. Pollution intensity was 1,3 - 2,7 times higher in New Member States than in EU₁₅ countries at the end of studied period.
7. Much more attention to the implementation of special environmental protection measures and reduction of pollution intensity should be paid in the nearest future in order to maintain further decoupling of environmental impact from economy growth.

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Naujosios ES šalys narės: ekonomikos vystymasis ir poveikis aplinkai

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Vienas pagrindinių ypač sparčiai besivystančių naujųjų Europos Sąjungos šalių narių darnios plėtros tikslų – yra atskirti ekonomikos augimą nuo poveikio aplinkai, t.y. pasiekti, kad augant ekonomikai gamtos išteklių naudojimas ir aplinkos teršimas didėtų daug lėčiau arba iš viso nedidėtų. Analizuojant šių šalių vystymąsi, daugiausia dėmesio skirta bendrojo vidaus produkto (BVP), energijos naudojimo ir oro teršimo tendencijoms bei darnios plėtros rodikliams – energijos ir teršimo intensyvumui pereinamuoju laikotarpiu. Energijos intensyvumas gana smarkiai (1,5 – 2,5 karto) sumažėjo 1991 – 2002 m. daugumoje analizuotų šalių, išskyrus Slovėniją. Nepaisant to, energijos intensyvumas daugumoje šalių išlieka gerokai (1,2 – 1,7 karto) didesnis nei EU₁₅ vidurkis. Teršimo intensyvumas (aplinką rūgštinančių teršalų kiekis sunaudotos energijos vienetui) tiriamuoju laikotarpiu sumažėjo ne tiek daug, o 2002 m. naujosiose šalyse narėse jis buvo 1,3 – 2,7 karto didesnis nei EU₁₅ vidurkis. Mažiausiai šis rodiklis sumažėjo Baltijos šalyse: Lietuvoje 11 %, Estijoje 12 %, o Latvijoje 37 %. Darnios plėtros požiūriu artimiausiu metu daug daugiau dėmesio reikėtų skirti specialių aplinkos apsaugos priemonių diegimui ir teršimo intensyvumo (teršalų emisija sunaudotos energijos vienetui) mažinimui.