

Economy growth, energy consumption and climate change: Lithuanian case

Renata Dagiliūtė, Inga Žiukelytė

Vytautas Magnus University

Recently European Commission has provided various initiatives to support policies for transition to low-carbon and green economy, as consumeristic approach to maximize income, the desire to have more has led to the financial crisis that in turn has shaken dominant economic model. The main aim of the Lithuanian National Sustainable Development Strategy (2009) is also to reduce environmental pressures related to economy development. Regarding this, the aim of the study is to examine dependence of energy consumption and greenhouse emissions from economic growth and possible tendencies according to three possible scenarios for economic development. Three possible scenarios for economic development has shown that if country's economy develops according to the first (16% overall GDP growth during the period) or second (zero GDP growth) scenario, the aim to decouple the economy growth from resource use and pollution would be reached to some extent. However, to reach significant improvement more pronounced economic growth is needed. In addition, energy and climate change related policies could highly contribute to the green growth and long-term sustainability.

Sustainable development, economic growth, energy consumption, climate change

Introduction

Economic development is inseparable from the use of resource and of course environmental pollution, even taking into account application of new cleaner technologies. EU agenda in the various strategies and programs (Roadmap for moving to a competitive low carbon economy in 2050, 2011; Resource efficient Europe, 2011; Green paper a 2030 framework for climate and energy policies, 2013 and etc.) stresses how important is to make more efforts in order to decouple economic growth from the use of resource and environment pollution. By signing the Lisbon Treaty in 2000, the EU has committed to make its economy dynamic, knowledge-based, efficient and green.

Recent economic crisis was and still is an opportunity to rethink if our society has chosen a right path of economic development, or maybe we need to look for others opportunities to ensure the social and environmental prosperity. In order to overcome economic crisis EU has adopted "Europe 2020" (2010) strategy on growth that is smart (through investments in education, innovation and research), sustainable (thru low carbon economy) and inclusive (focus on job creation and poverty eradication). To implement these ambitions by 2020 strategy is focusing on five core goals in the areas of employment, innovation, poverty reduction, education and climate/energy package. The EU headline target of climate and energy is triple 20-20-20 goal and has to be met by 2020. This target corresponds to 20% reduction in greenhouse gas emissions (if conditions are right by 30%), increase the share of renewable energy sources in final energy consumption to 20% and a 20% improvement in energy efficiency. These three key objectives for 2020 represent an integrated approach to climate and energy policy that aims to combat climate change, increase the EU's energy security and strengthen its competitiveness (European Environment Agency, 2013).

Recently there been many discussions about degrowth, steady state, green and other economy models. Among experts there are a lot of discussions which model is better, but experts have a common agreement that economy cannot be developing as now, because it's a recipe for economic, environmental and social collapse (O'Neill,

2012; Van den Bergh, 2010a; Assadourian, 2012; Corfee-Morlot et al., 2012; Juknys et al., 2014).

For developed countries, in which economy growth does not bring any additional prosperity, it is suggested to choose degrowth or steady state economy models. One economic development model should change other. According to O'Neill (2012) rich countries need to apply degrowth and then make transition to steady state economy model. Degrowth for rich countries help to meet basic society needs and ensure high quality of life, but at the same time reducing the ecological impact of the global economy to a sustainable level and achieving equity between all countries. When that level is reached through the process of degrowth, the next aim should be to maintain a steady state economy with a relatively stable, mildly fluctuating level of consumption with fair distribution of income and high quality of life (O'Neill, 2012 <http://steadystate.org/discover/briefing-papers/>, 2012).

For those countries, which still can benefit from economic growth it is suggested to make economy growth sustainable by choosing green growth, low-carbon and others models (OECD, 2011; O'Neill, 2012; EEA, 2013a; OECD, 2013). Green growth puts human well-being at the centre of development, while ensuring that natural capital continues to provide the resources and environmental services to support sustainable development. Thus, concept of green growth is narrower in scope, but it provides a policy agenda that can help to achieve concrete, measurable progress at the interface of the economy and the environment. Green growth promotes a cost-effective and resource efficient way of guiding sustainable production and consumption choices (OECD, 2011; OECD, 2013).

Lithuania is considered a country with transition economy (Juknys et al., 2005). Its development varies greatly from both developed and developing countries. The aim of the study is to examine dependence of environment variables on economic growth and possible tendencies taking into account opportunities to achieve foreseen targets, according to three possible scenarios for economic development over 2010–2020. It is essential to know how achievement of economic goals could change environmental indicators according NSDS (2009).

Methods and data issues

In this study, GDP, energy consumption, and greenhouse emission indicators are analysed. Data from Eurostat and Ministry of Finance of Lithuania were used for the analysis.

Despite some critique, GDP per capita reflects goods and services produced within the borders of a country. In order to determine GDP annual growth rate needed to achieve EU-15 2003 GDP level until 2020, GDP per capita applying purchasing power parity (PPP) allowing making comparative analysis among countries (Eurostat Statistical Book, 2011) was used. Forecasting GDP growth at different scenarios, probability of new economic crisis was not evaluated, also it has been assumed that development of technology and deployment in the sectors will remain at current pace, population will remain stable.

Three GDP growth scenarios were compiled:

- Scenario 1 – Real GDP growth – assumes that GDP growth remains at current pace. The GDP growth forecast until 2015 was taken from Ministry of Finance database. Forecasting GDP growth from 2016 until 2020, 3-year moving average method was used in this case. In total GDP should grow about 16 %, from 14.000 PPS/cap in 2010 until 16.562 PPS/cap in 2020. Such growth pace would not let implement main NSDS aim to reach 2003 EU-15 economic level by 2020.
- Scenario 2 – Zero GDP growth – assumes that GDP growth from 2010 until 2020 would remain stable, i.e. 14 000 PPS/cap.
- Scenario 3 – 5.4% GDP growth – assumes that from 2010 Lithuanian GDP will grow 5.4% annually to achieve EU-15 average GDP of 2003 in 2020. NSDS (2009) goal to reach 5–6 % GDP annual increase would be successfully implemented Lithuania.

Results and discussion

Trends of energy consumption and environmental pollution indicators

On the one hand, economy is highly dependent on natural resources and ecosystems services, on the other intensive use of natural resources and rapid economy development has caused natural resources and ecosystems degradation that extremely intensified climate change, biodiversity loss, and increase of waste and air pollution and as consequence hampers economic development. To solve these problems countries must devote enormous resources.

During 2000–2010 GDP increased 34%, energy consumption – 21%, electricity consumption – 25%, GHG – 7% in Lithuania (Fig. 1). All analysed indicators had tendency to growth from 2000 until 2007, however during the economic crisis were on decreasing trend. When economy started to recover, all analysed indicators started to growth again. Main goal of NSDS (2009) is to achieve that the growth of the consumption of natural resources would be twice slower compare to the growth of services and production, however during 2000–2010 economy grew only 1.6 times faster than energy consumption and only relative decoupling was taking place. In the other words,

this still indicates economy and resource consumption and pollution coupling (Fig. 1).

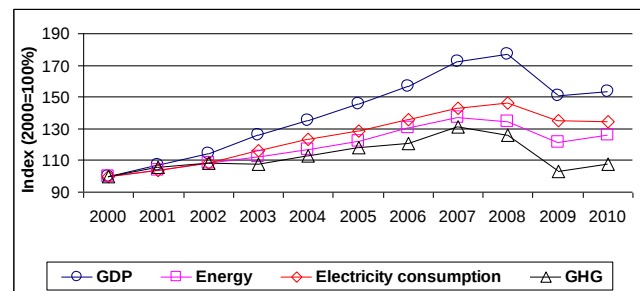


Fig 1. GDP, energy and pollution changes in 2000-2010 period
1 pav. BVP, energijos ir taršos pokyčiai 2000-2010

Goal of NSDS (2009) is to achieve that the growth of the consumption of natural resources would be twice slower compare to the growth of services and production. However, if economy would develop under scenario 1 (Real GDP growth) this goal would not be fully implemented (Fig. 2). GDP would increase 16%, final energy consumption would increase from 4751 toe in 2010 till 5337 toe in 2020, i.e. increase 11%, this means economy will growth only about 1.45 times faster than energy consumption. According to the scenario 2 (Zero GDP growth), final energy consumption and GDP growth until 2020 will remain stable. According to scenario 3 (5.4% GDP growth), final energy consumption would growth from 4751 toe in 2010 until 6545.5 toe in 2020, i.e. would increase 27%. Meanwhile Lithuanian GDP would increase 40%, this means final energy consumption would growth 1.48 time slower than GDP.

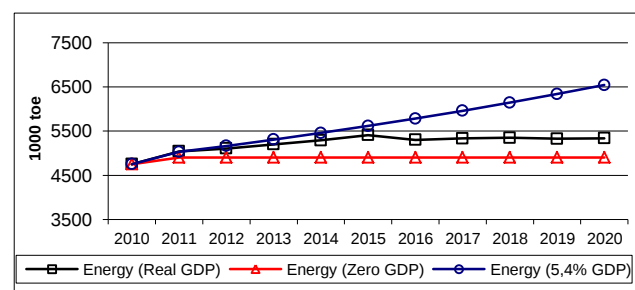


Fig. 2. Final energy consumption changes in 2010-2020 period
2 pav. Galutinės energijos naudojimo pokyčiai 2010-2020

In National reform programme (2013), national energy efficiency target is to consume 17% (740 k toe) less energy compared to 2009. Under scenario 1 (Real GDP growth), energy consumption efficiency would increase by 10.1%, this energy efficiency increase will not let implement goal provided in National reform programme. Scenario 2 (Zero GDP growth) also will not let achieve this goal, because energy consumption efficiency would increase only 2.2%. Under scenario 3 (5.4% GDP growth), Lithuania would successfully achieve the goal and even exceed the set limit (17%). Final energy consumption efficiency until 2020 would increase about 23%. According to National energy strategy (2010), the largest energy saving potential exists in the household (insulation of public building and modernization of multi-apartment houses) and transport (reducing imports of old cars, shift towards green and

modern public transport, and promotion of investments into environmentally friendly means of transport) sectors.

It is important not only to decouple economy growth from resource consumption, but also to decouple economy growth from environmental pollution. According scenario 1 (Real GDP growth) (Fig. 3) GHG emissions would increase about 6% from 23 million tons in 2010 until 25 million tons in 2020. According to scenario 2 (Zero GDP growth), GHG emissions during all period would remain stable at 23 million tons per year. Under scenario 3 (5.4% GDP growth), GHG emissions would increase 20%, from 23 million tons in 2010 until 28.7 million tons in 2020.

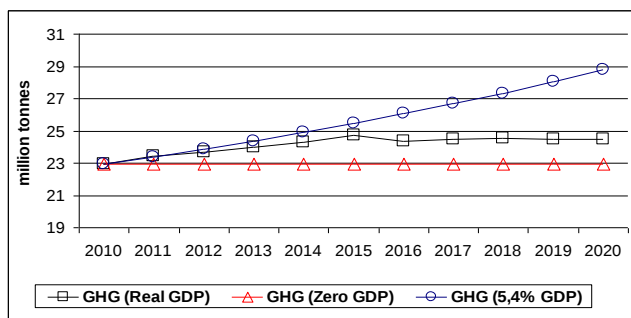


Fig 3. GHG emissions changes in 2010–2020
3 pav. Šiltnamio dujų emisijos pokyčiai 2010–2020

Having in mind that under scenario 3, GDP would increase about 40%, GHG emissions increase about 20% indicates, that pollution would growth twice as slow as economy, hence main goal of NSDS could be successfully implement in Lithuania.

However, all scenarios indicated no decrease in energy consumption and GHG emission. How Lithuania will be able to reduce GHG emissions highly depends on the course of energy sector development and measures government decides to implement to reduce climate change in economy sectors (National Reform Programme, 2013). According to National Energy Strategy (2010) largest impact to reduce GHG emissions are in development of the nuclear power plant (least probable in the recent situation), increasing energy production from renewable energy sources and increase efficiency of energy consumption. The highest potential to reduce GHG emissions has industry (joint implementation projects, changing cement production technology), agriculture (implementation of the nitrates directive), and electricity production sectors. In each of these three sectors, potential to reduce GHG emissions is approximately 20% - 30% (National Energy Strategy, 2010).

Development possibilities and climate change and energy related policy

Results indicate that Lithuania still needs economic growth to secure stability in social sphere and environmental promotion. On the other hand, principles of green growth should be employed clearly and firmly on national and sectoral policy and everyday life. This should create possibilities not only prioritize economic issues, but also contribute to stable long-term economic and environmental sustainability.

Recently European Commission has provided various initiatives to support policies of transition to low-carbon economy, more efficient use of energy and natural resources. One of the main European Commissions initiatives is the “Roadmap for moving to a competitive low carbon economy in 2050”. Lithuania has committed to contribute to the implementation of the EU GHG reduction milestones as defined by the Roadmap. In order to achieve national climate change targets and objectives the Parliament of Lithuania has adopted National Strategy for Climate Change Management Policy for the period 2013–2050 (hereinafter – Strategy), also Government approved an Action Program with the concrete measures for the implementation of targets and objectives. The Strategy covers international commitments and the main goals related to climate change adaptation and mitigation. Its main goal is to develop a competitive low carbon economy, which would be based on use of renewable, energy efficiency improvement and innovations. The Strategy is based on climate and energy package legislation and sets out mandatory targets until 2020. The main goal of climate change mitigation policy is to achieve that the national economy growth would be faster than the increase of GHG emissions in Lithuania. The strategic goal of the Lithuanian adaptation to climate change policy is to reduce vulnerability of the natural ecosystems and national economy sectors by implementing measures that preserve and increase the resistance to climate change, and maintain beneficial conditions of social life and economy activities. National energy policy defines objective to increase energy efficiency and supports European Commissions on its efforts to long-term investments in energy infrastructure. Other objectives are to secure affordable and sustainable energy supply, to support industrial competitiveness and to promote efficient low-carbon technologies, research and innovation, which should stimulate creation of new jobs and economy growth. Responsibilities to implement Strategy targets and objectives distributed among all Lithuanians institutions. Ministry of Environment is coordinating the implementation of Strategy. More responsibilities (like a new renovation program) have been attributed to municipalities in order to ensure better inclusion of the public actors. Municipalities are closer to the interests and concerns of the public, because of this reason they are responsible for identification of the most energy inefficient buildings and appointment of renovation process administrators. In addition, municipalities are responsible for the development of programmes that promote effective energy use (European Commission, 2011; Ministry of Environment, 2012; Ministry of Environment, 2012a).

As Lithuania still needs some growth, implementation of all these targets and foreseen measures could contribute highly to green economy growth in Lithuania. This also would enable long-term sustainability and decoupling economy from environmental pressures more significantly than presented in the scenarios.

Conclusions

1. The main goal of NSDS (2009) to achieve twice slower growth of the consumption of natural resources to

compare to the growth of services and production, was partly achieved over 2000–2010, as Lithuanian GDP grew faster than analysed indicators (energy and GHG) during this period.

2. Under scenario 1 (Real GDP growth), GDP would grow about 16%, from 14.000 PPS/cap in 2010 until 16.562 PPS/cap in 2020. Such growth rate will not allow to implement main NSDS aim to reach 2003 EU-15 economic level by 2020. In addition, it would hamper implementation of other goals.

3. With scenario 2 (Zero GDP growth), Lithuania might face many problems, though energy and GHG would remain stable. Due to declining of economy to achieve all goals, efficiently implement all strategies, plans and programs would be very difficult. This scenario also would not lead to the implementation of main NSDS aims of socio-economic development.

4. Results reveal that some growth (Scenario 3 - 5.4% GDP growth), even facing increase in energy demand and GHG, is still needed for Lithuania to reach certain level of development. Hence, green growth could be an option for Lithuania. Discussed energy and climate change related policies could highly contribute to the green growth and long-term sustainability.

List of Literature

- ASSADOURIAN E. The path to degrowth in overdeveloped countries. State of the world 2012. Moving towards sustainable prosperity. 2012. p. 22–37.
- CASSE. What is Steady-State economy? Briefing paper. Arlington, VA 22204. 2013. p. 2. [http://steadystate.org/wp-content/uploads/CASSE_Brief_SSE.pdf]
- CORFEE-MORLOT, J. et al. Towards a green economy investment policy framework: The case of low-carbon, climate-resilient infrastructure. OECD Environment Working Papers, 2012, No. 48. [<http://dx.doi.org/10.1787/5k8zth7s6s6d-en>].
- European Commission. Communication from the Commission 2020 Europe. A strategy for smart, sustainable and inclusive growth. Brussels. 2010. p. 34.
- European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions. A resource-efficient Europe - Flagship initiative under the Europe 2020 Strategy. Brussels. 2011. p. 17.
- European Commission. A Roadmap for moving to a competitive low carbon economy in 2050. 2011a. p. 16.
- European Commission. Green paper. A 2030 framework for climate and energy policies. COM (2013) 169 final. 2013. Brussels. p.16.
- European Environment Agency. Trends and projections in Europe 2013: Tracking progress towards Europe's climate and energy targets until 2020. Report. No. 10/2013. p. 144.
- European Environment Agency. Towards a green economy in Europe. EU environmental policy targets and objectives 2010–2050. Report No. 8/2013. 2013a. p. 52.
- Eurostat Statistical Books. Sustainable development in the European Union. 2011 monitoring report of the EU sustainable development strategy. European Union. 2011. p. 382.
- Government of the Republic of Lithuania. National Sustainable Development Strategy. Resolution No.1247. 2009. Vilnius. p.100.
- Government of the Republic of Lithuania. National energy (energy independence) Strategy. Resolution No. 1426. 2010. Vilnius. p. 43.
- JUKNYS, R., LIOBIKIENE, G., DAGILIUTE, R. Sustainability of catch-up growth in the extended European Union. Journal of Cleaner Production, 2014, 63, 54–63.
- JUKNYS, R., MIŠKINIS, V., DAGILIUTĖ, R. New Eastern EU Member States: Decoupling of Environmental Impact from Fast Economy Growth. Environmental research, engineering and management, 2005, 4 (34), p. 68–76.
- Ministry of Economy. Lithuania: Nation Reform Programme 2013. Vilnius. 2013. p. 110.
- Ministry of Energy. Strategy on Promotion of Renewable energy sources. Vilnius. 2010. p. 133.
- Ministry of Environment. National Strategy for Climate Change Management Policy for the period 2013–2050. 2012. p 78.
- Ministry of Environment. Lithuanian Climate Change management policy and its implementation. 2012a. [<http://www.am.lt/>]
- O'NEILL W.D. Measuring progress in the degrowth transition to a steady state economy. Ecological economics, 2012, 84. p. 221 – 231.
- OECD. Towards green Growth. OECD. 2011. Paris.
- OECD. Putting green growth at the heart of development. Summary for policy makers. OECD. 2013. p. 24.
- VAN DEN BERGH. J.C.J.M. Environment versus growth – A criticism of „degrowth“ and plea for „a-growth“. Ecological Economics, 2010, 70. p. 881 – 890.

Renata Dagiliūtė, Inga Žiukelytė

Ekonomikos augimas, energijos sąnaudos ir klimato kaita: Lietuvos atvejis

Santrauka

Europos Komisija yra pateikusi įvairių iniciatyvų, siekiant paremti politiką, pereinant prie mažo anglies dioksido kiekio ir „žalios“ ekonomikos, kadangi vartotojiškas požiūris, noras turėti daugiau, lėmė finansų krizę, sukrėtusią dominuojantį ekonominį modelį. Pagrindinis Lietuvos Nacionalinės darnaus vystymosi strategijos (2009) tikslas taip pat yra sumažinti su ekonomikos plėtra susijusį poveikį aplinkai. Dėl to, šio tyrimo tikslas yra ištirti energijos ir šiltnamio reiškinių skatinančių teršalų išmetimo priklausomybę nuo ekonomikos augimo ir galimas tendencijas pagal tris ekonominio augimo scenarijus. Trys galimi ekonominio augimo scenarijai parodė, kad jei šalies ekonomika vystysis pagal pirmąjį (16 % BVP augimas per laikotarpį) arba antrą (nulinis BVP augimas) scenarijų, tikslas atsieti ekonomikos augimą nuo išteklių naudojimo ir taršos būtų pasiektas tik tam tikru mastu. Tačiau, norint žymiai pagerinti situaciją, reikalingas spartesnis ekonominis augimas. Be to, energetikos ir kovos su klimato kaita susijusios politikos galėtų labai prisidėti prie „žalio“ augimo ir ilgalaikio darnumo.

Darnus vystymasis, ekonomikos augimas, energijos suvartojimas, klimato kaita

Gauta 2014 m. kovo mėn., atiduota spaudai 2014 m. balandžio mėn.

Renata DAGILIUTĖ. Vytauto Didžiojo universiteto Aplinkotyros katedros lektorė, biomedicinos mokslų daktarė. Adresas: Vileikos g. 8, LT-44404 Kaunas. Tel. (8 37) 327904 el. paštas: r.dagiliute@gmf.vdu.lt

Renata DAGILIUTĖ. Vytautas Magnus university, Faculty of Natural Sciences, Department of Environmental Science, doctor of biomedical sciences, lecturer. Address: Vileikos g. 8, LT-44404 Kaunas. Tel. (8 37) 327904. Tel (+370 37) 32 79 04, e-mail: r.dagiliute@gmf.vdu.lt.

Inga ŽIUKELYTĖ. Vytauto Didžiojo universiteto Aplinkotyros katedros magistrė. Adresas: Vileikos g. 8, LT-44404 Kaunas. Tel. (8 37) 327904 el. paštas: i.ziukelyte@alumni.vdu.lt

Inga ŽIUKELYTĖ. Vytautas Magnus university, Faculty of Natural Sciences, Master of Environmental Science. Address: Vileikos g. 8, LT-44404 Kaunas. Tel (+370 37) 32 79 04, e-mail: i.ziukelyte@alumni.vdu.lt.