

Green Growth in the OECD: State of the Art

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SUMMARY

The concept and initiative of green (world) economy but especially the greening of industry is not new. It appeared 20 years ago at the Rio World Summit, and since that time it has been discussed constantly, integrating more new and complex approaches, but particularly gaining focus in context with the increasing negative environmental impacts and global warming. As the advanced economic globalisation and acceleration of trade has increased the degradation of environment (damages and risk), a new strategic orientation became essential. That was the reason why a proposal at the Rio+20 World Summit initiated global environmental governance for the first time (Biermann et al. 2012). At the same time, requirements and expectations escalated to develop a green but even more a blue economy (Paoli 2010). But as the analysis of country statistics has shown, the level and status of the greening varies by countries. With the comparison of the green index and the FOI indices (Bartha - Gubik 2013a, Bartha – Gubik, 2014c)) those countries can be identified which have already made great progress in this matter and should thus be a good example to follow.

It is well known that growth theories examine, analyse and explain the phenomenon and main factors of development, but they tend to consider only the economic aspects of growth, explaining and categorising the triggering factors into inside and outside factors, without giving any characteristic role to the natural environment in development. However, experts of sustainability and leading representatives of ecological economics have pointed out that the three pillars of development, based on the key issues of social well-being, should be complemented with the aspects of sustainability. This paper summarises the main steps, results and bottlenecks of the way towards green world economy.

Key words: Green growth, green index, eco-innovation, development, sustainability

Journal of Economics Literature (JEL) code: Q20, Q56

INTRODUCTION

The concept of green economy has been generally accepted in 2009, when the United Nations Environment Programme (UNEP) Environmental Management Group discussed how the United Nations could provide a more coherent and effective support for countries to help them in the transition toward a "green economy" (EMG/SOM.15/02). Since then the term "green economy" is increasingly used, without having been properly defined or given any common understanding of the conceptual issues underlying the term.

The green economy was a direct response to the occurring environmental changes and can be considered as a possible pathway to ground and reach economic recovery and sustainable development, which have to be integrated into the various sectors of society after the financial and economic crisis. Not only UNEP and OECD, but the World Bank, WTO and IMF support the concept of green economy; in addition, its acceptance is wide at governmental levels, too. Measurement of the 'greening of economy' has become a debated topic and a researched issue in the past decades as well.

What is the green economy?

We can find various terms for green economy. Basically, the green economy is sustainable development combined

with the principals and findings of industrial ecology (Opschoor 1995). UNEP defined it as a sustainable economy and society with zero carbon emissions and a one-planet footprint where all energy is derived from the renewable resources. It envisages an economic growth (income and employment) that is driven by public and private investments that reduce both carbon emissions and other pollutants and also energy demand.

"The green economy is not a freebie. It is costly but it is much less costly than not doing it, but it is a politician's nightmare to try and sell short-term costs in order to avoid the long-run costs. Politicians are too scared of asking people to pay" said Sachs (2010). The transition towards green economy requires investments of at least 5 trillion USD per year between 2010 and 2030 by WEF (2013) to BAU scenario, which is probably less than the cost of externalities. The green economy will result in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities (Burkart 2009). It is an economy concerned with being environmentally sustainable, socially, just locally rooted, as said by Bapna & Talberth (2011) and Danaher (2012). The green economy rigorously applies the triple bottom line on the people (GEG, Green Economy Group, <http://greeneconomygroup.com/company/green-economy-definition/>), planet and all profit-oriented organisations, across all corporations at the microeconomic level and throughout the entire economy at the macroeconomic level.

The documents of GEG determine its main characteristics and its industrial representatives.

The green economy supports the transition towards a sustainable, carbon-neutral economy by having green entrepreneurs and green jobs. It is a new model of creating new jobs and sustaining the economic development (Pop et al. 2011). The model of Gouvea et al. (2012) introduces the green sustainable resources in addition to the traditional triple helix of industry – academia, government and private companies – revealing the significance of geographical clusters and factor endowments on green competitiveness in the global economy. Carfi and Schilirò (2012) address the climate change policy and diffusion of low-carbon technologies to reach the green economy. The Global Environmental Governance (GEG) highlights the sum of the following factors in an effective and preventive environmental protection system: organisations, policy and financial instruments and regulation tools (standard and norm).

Indicators of Green growth

The Green Economy Initiative (GEI) of UNEP (2009) provides analysis and guidance for countries on policy reforms and investments to support them in achieving the green transformation of key sectors of their economy. The first report of the GEI demonstrates “Towards a Green Economy – the main output of the Green Economy Initiative – demonstrates that the greening of economies is not generally a drag on growth but rather a new engine of growth; that it is a net generator of decent jobs, and that it is also a vital strategy for the elimination of persistent poverty. The report also seeks to motivate policy makers to create the enabling conditions for increased investments in a transition to a green economy in three ways (p. 3).”

After the first Green Economy Report (OECD 2011) the OECD also published its own green strategy and measurement guidelines in 2011. According to this report, the sources of green growth are the following: productivity, innovation, new markets, confidence, stability, resource scarcity and imbalances. The applied indicator set represents the main elements of green development, covering the field of production, natural environment quality and resources, consumption, trade and policies and their interactions. Both the UNEP and OECD use similar indicator sets and topics. The framework and methodology of the measurement was determined by the OECD. The goal of the measurement agenda is to develop an environment-economy accounting framework so to maximise consistency and international comparability.

Table 1
Selected green indicator groups and topics

Indicator groups	Indicators
Environmental resources, economic productivity	Carbon and energy productivity Resource efficiency: material, nutrients, water Multi-factor productivity
Natural assets	Renewable stocks, Non-renewable stocks Biodiversity and ecosystems
Environmental dimension of the life quality	Environmental health and risks Environmental services and amenities
Economic potentials and policy responses	Technology and innovation Environmental goods and services International financial flows Prices and transfers Skills and training Regulation and management approaches
Socio-economic context and characteristics of growth	Economic growth and its structure Productivity and labour market, education, income Socio-demographic patterns

Source:

<http://www.oecd.org/greengrowth/greengrowthindicators.htm>

The indicator groups content sets of different indicators. The first set contains 23 indicators, and is currently the largest. Green innovation in the form of patents can give us a good picture about the greening of the economy. The largest number of green patents arise in material science (Figure 1). In Hungary the most characteristic sign of green growth is well represented by the number of the green patents (Figure 2). The number of green patents were the highest in 2007, what are considering with the supplement of government.

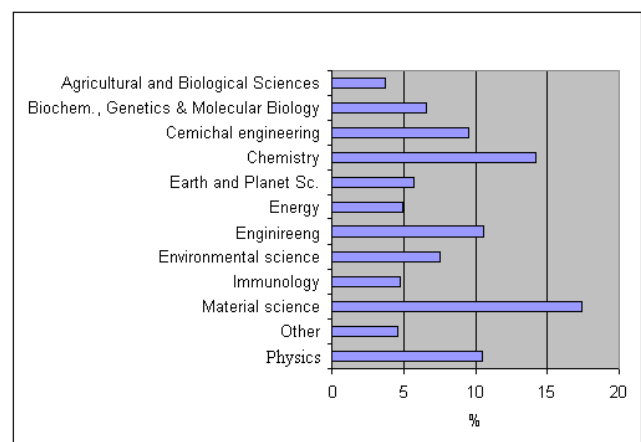


Figure 1. Patents related to green technology, 2000-2007, global data (total patent = 100%)

Source: <http://www.oecd.org/greengrowth/48012345.pdf> page 12

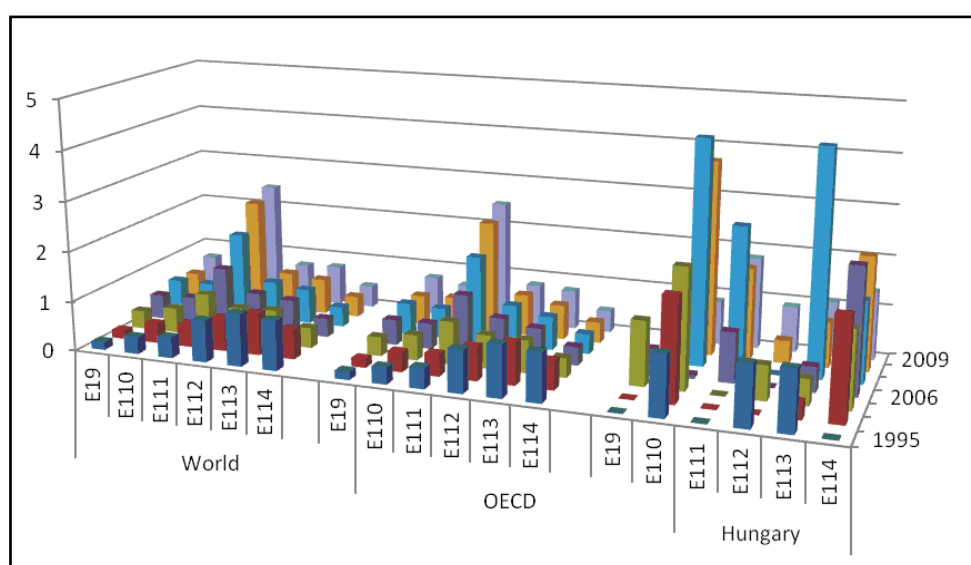


Figure 2. Patent types by sector – as a percentage of total patents (%)

Additional information: E19: electric & hybrid vehicle; E110:electric efficiency - building & lighting; E111: RES; E112: air pollution; E113: water pollution; E114:waste management
Source: OECD database, 2012

Progress in Green economy monitoring

The OECD maintains several databases in addition to the formerly mentioned indicator groups, and has statistical data for green growth since 1995. Beside these, OECD regularly monitors the progress and status of green growth through the specified green growth indicators.

“The framework of Green economy indicators comprises the following three principal areas:

- “Green transformation of key sectors and the economy” focusing on investments in a green transformation of various economic sectors and their associated share in output and employment.
- “Decoupling and Efficiency” assessing resource efficiency and productivity, and the decoupling of economic activity from resource use and related environmental impacts, at both sector and economy-wide levels, building on the outputs of the International Resource Panel.
- “Aggregate indicators of progress and well-being” referring to various initiatives on overall measures of economic progress and well-being, including poverty alleviation and natural capital depreciation.

Depending on the level of economic development and natural resource usage ratio, countries may choose to prioritise different sets of indicators.” (<http://www.oecd.org/greengrowth/greengrowthindicators.htm>)

We must consider also all new fields that have been identified and analysed in the last years (Green growth and sustainable development <http://www.oecd.org/greengrowth/greengrowthindicators.htm>):

- Environmental performance and resource productivity – the report has been focusing on the

measurement of material flows and resource productivity;

- Trends in energy usage and efficiency mainly related to the Clean Angel Plan of the Action for Climate Change;
- Technology developments and innovation - where the focus is on indicators which support the OECD Innovation Strategy, and on an indicator toolkit which promotes and monitors sustainable manufacturing at corporate level;
- Environmental performance of agriculture was monitored with the measurement of agricultural producer support;
- Monitoring of international transfer;
- Sustainable development - the measurement of different types of capital with an emphasis on human and social capital;
- Wellbeing and progress – the OECD aimed at implementing the recommendations of the Stiglitz-Sen-Fitoussi Commission with an emphasis on well-being and sustainability.

– In addition, the OECD maintains further databases on a wide range of other topics that play an important role in characterising economic growth and its outcomes. Examples include: national accounts, international trade, balance of payments, prices and taxes, productivity, government debt, employment, education and health. Some countries of the world have already applied the measurement of green growth in practice (e.g.: the Netherlands, the Czech Republic, South Korea, Costa Rica, Latin American countries) with the support of OECD or UNIDO.

AN ALTERNATIVE MEASURING THE TRANSITION TO GREEN ECONOMY

Applied methodology

Unlike many different indicators introduced above, our aim is to introduce an index that can be capable to measure, express and at the same time compare the state and progress of the countries toward green economy. To complete this mission the methodological development of a complex, integrated index is necessary that can enable us to obtain a more comparable measurement unit expressed as a sole number or scale. For this purpose we developed the green index (G_i) (Bartha-Gubik-Tóthné 2013a), which is a composite index calculated by the two following steps.

1) Firstly we determined the indicator index and set the scale between a minimum and maximum value of each green indicator in OECD countries:

$$I_i = (X_i - X_{\min}) / (X_{\max} - X_{\min})$$

where I_i is the indicator index

X_i the observed indicator;

$X_{\min}$ the minimum value of the observed indicator

in OECD countries;

$X_{\max}$: the maximum value of the observed

indicator in OECD countries;

This step was a dimension exemption. The indicator index (I_i) value is represented by a value ranging from 0 to 1.

2) Secondly we calculated the Green index (G_i) of countries, which is calculated with the average of all green indicator indexes of the observed country.

$$G_i = \sum_{i=1}^n I_i / n$$

The calculation was made for two years: 2005 and 2008.

Green index in the OECD countries

Based on this methodology we calculated the Green index of all OECD countries (results are shown in Figure 3). If a country performs well in the transition to a Green economy, the green index is near to 1. Considering the results of all countries, we can easily give the conclusion that there are no countries above the value of 0.50. For 2005 Norway has the highest value, with 0.48, and second best is case of Greece, with 0.44, but in 2008 Norway (0.44) and Sweden (0.40) have the best Green indexes.

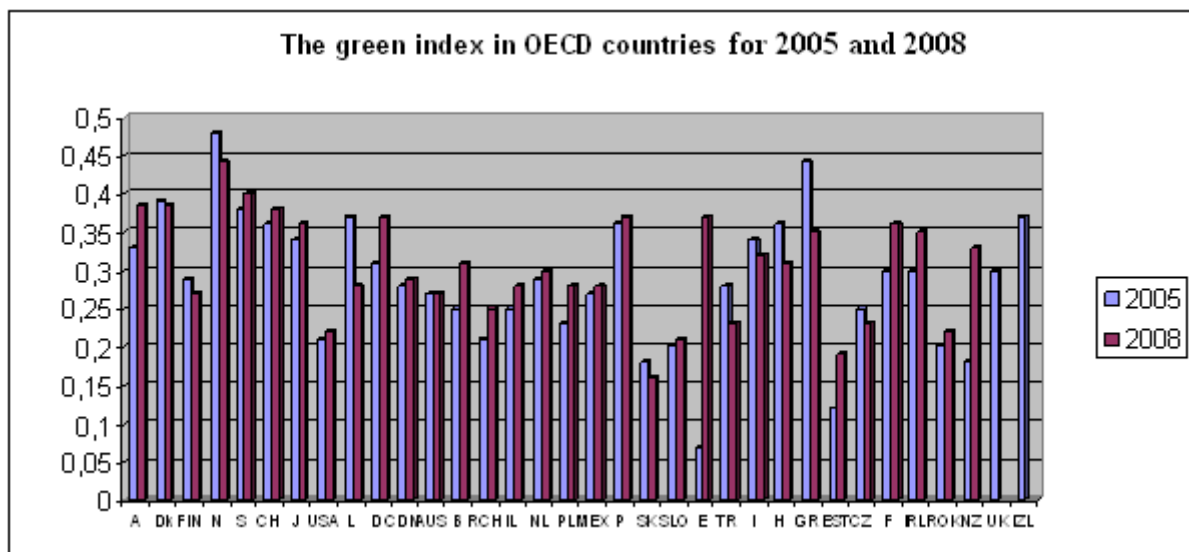


Figure 3. The Green index in the OECD countries

Source: Bartha-Gubik-Szita Tóthné 2013

According to the Green index, the countries with the greenest economies were

- in 2005: Norway, Greece, Denmark, Luxembourg and Iceland;
- in 2008: Norway, Sweden, Austria, Denmark and Luxembourg.

In 2008 the greening process stagnated or increased in one-third of the countries, compared to 2005 figures, most probably because of the financing economic crises. So based on the Green index we can state that in the examined period the green growth and green performance of the OECD countries was not significant.

Connection of the Green index and FOI model analysis of the OECD countries

We compared the green performance of the OECD countries with the values of the FOI index (Bartha & Gubik, 2013a). Our hypothesis is that we could determine a new alternative developing way on base of these indices.

The FOI model analysis was a multi-stage statistical method. The FOI model is based on a three-dimensional structure. These three dimensions are (Bartha – S. Gubik, 2014a):

➤F, i.e. the future potential of a country;

➤O, i.e. the outside potential of a country;

➤I, i.e. the inside potential of a country.

All three dimensions are complex, composed of a large scale of factors. Yet they can still be clearly distinguished from each other, which is useful because the clear distinction can help in the formulation of distinctive development strategies. The future potential includes factors that are regarded to be crucial for the sustainability and

future competitiveness of the given economy, in this case the Hungarian economy. The outside potential includes factors that are crucial to the current world market position of Hungary (Bartha – Gubik, 2014b). The inside potential is made up of factors that are regarded to be crucial to the current well - being and development of the country (Barta & Gubik 2013b).

Table 1
Relationship between Green index (G_i) and Future (F_i), Inside (I_i) and Outside (O_i) potential of the OECD countries

Index/country	Austria	Denmark	Finland	Norway	Sweden	Switzerland
Fi	4.7	4.8	5	5.2	5.1	5.4
Oi	5.41	5.77	5.72	5.7	5.22	5.37
Ii	4.05	4.3	4.02	4.13	4.13	4.89
Gi	0.385	0.385	0.27	0.44	0.4	0.38
Index/country	USA	Belgium	Germany	Canada	Australia	New Zealand
Fi	3.8	3.9	4.3	3.9	4.2	4.2
Oi	4.27	5.56	5.26	5.41	5.32	4.52
Ii	4.47	3.47	3.73	4.5	4.35	4
Gi	0.22	0.31	0.37	0.29	0.27	0.33
Index/country	Israel	Estonia	Poland	Mexico	Portugal	Slovakia
Fi	3.6	3	2.9	2.7	3.5	3
Oi	4.89	4.94	4.42	3.98	4.33	4.82
Ii	4.13	3.08	3.07	2.85	2.91	3.25
Gi	0.28	0.19	0.28	0.28	0.37	0.16
Index/country	Spain	Turkey	Italy	Hungary	Greece	Czech Republic
Fi	3.4	3.3	3.5	2.9	2.9	3.1
Oi	4.23	3.63	3.82	4.56	3.66	4.97
Ii	2.99	3.14	2.66	2.55	2.5	3.57
Gi	0.37	0.23	0.32	0.31	0.35	0.23
Index/country	France	Ireland	Korea	Luxemburg	UK	The Netherlands
Fi	4.4	3.9	4	5.3	3.9	4.4
Oi	4.46	4.17	4.26	6.56	4.35	5.54
Ii	3.04	3.91	3.33	4.45	3.6	3.83
Gi	0.36	0.35	0.22	0.28	0.3	0.3
Index/country	Japan	Chile	Slovenia	Iceland		Average
Fi	4.8	3.8	3.4	5.9		4
Oi	3.68	5.03	5.08	2.33		4.74
Ii	4.01	4.13	2.7	4.42		3.65
Gi	0.36	0.25	0.21	0.37		0.306

Sources: Gubik & Bartha 2013a, and own calculations

Based on the comparison of the indexes, those countries show a strong future potential and green growth for which the Future index is above 4.7 (average Fi: 4.0) and the average Green index is above 0.35 (average Gi: 0.306). These countries are (Figure 4):

*Austria (4.7; 0.385),
Denmark (4.8; 0.385),*

*Norway (5.2; 0.44),
Sweden (5.1; 0.4),
Switzerland (5.4; 0.38),
Japan (4.8; 0.36),
Iceland (5.9; 0.37).*

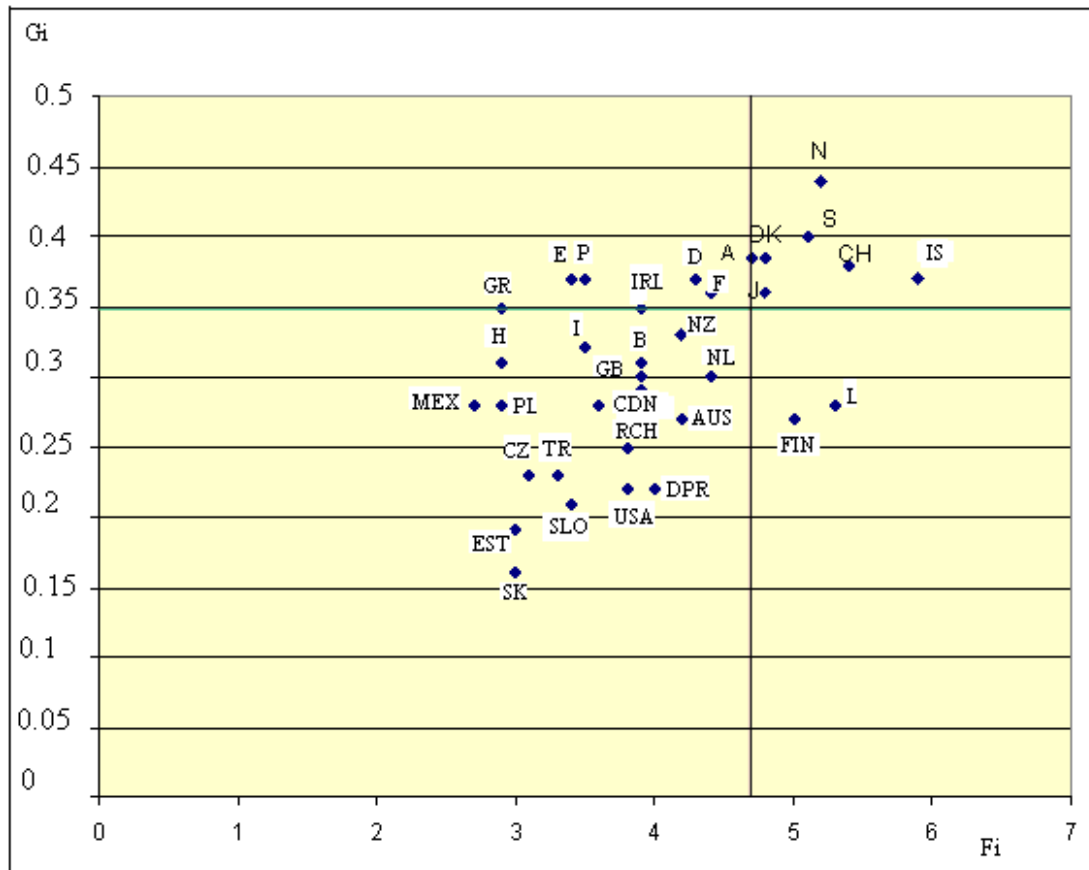


Figure 4. Relationships between the Future index (Fi) and Green index (Gi)

Some countries have relatively good green performance (G-index > 0.35) while their Future index value is less than 4.7 (Iceland, Japan, France, Ireland, Czech, Spain, Portugal or Greece, where the F-index is the second lowest value). The analysis of the relationship between the Outside index and Green index is considered for greening countries. If the O-index is > 5.0; and G-index > 0.35; (average values: O-index: 4.74, G-index: 0.306), we consider a country to be greening. So the following countries are greening:

*Austria (5.41; 0.385),
Denmark (5.77; 0.385),
Norway (5.7; 0.44),
Sweden (5.22; 0.4),
Switzerland (4.89; 0.38),
Germany (5.26; 0.37).*

Luxemburg has the highest value of O-index, but the green performance is lower than average; (6.56; 0.28). The following countries also have relatively high O- and G-indexes: France (4.46; 0.36), Spain (4.23; 0.37), Portugal (4.33; 0.37) are near to the greening group, but because of the lower Fi and Ii they are not members of the green group. Iceland has good green performance but its O-index is very low (2.33; 0.37).

The relationship between the Internal index and Green index was examined in case of those countries where the internal potential has an index higher than 4 and the Green index is higher than 0.35 (averages: I-index: 3.65, G-index: 0.306). Accordingly the following countries seem to be green:

*Austria (4.05; 0.385),
Denmark (4.3; 0.385),
Norway (4.13; 0.44),
Sweden (4.13; 0.4),
Switzerland (4.89; 0.38),
Japan (4.01; 0.36),
Iceland (4.42; 0.37).*

Finally we chose the countries which were in all three groups as the best practice of green growth: Austria, Denmark, Switzerland, Norway and Sweden.

How far is the world from green economy?

Our research showed that the OECD countries are moving in the direction to reach Green economy, but they are relatively far from it. We chose countries which were on the top of the three comparisons and we proposed these 5 countries as the best practices of green growth on the basis

of the relationship between the FOI and Green indexes. The countries are Norway, Sweden, Denmark, Austria and Switzerland. All of these countries performed well not only in green growth, but they were on the top in other development models too, which is shown by the deeper country analysis and FOI model. We can say these countries are modelling green development based on eco-innovation. As we could see, the interpretation of green economy differs in several features of conventional economics. While conventional economics only theorise about economics, green economy has a much more profound view and is integrated with the principals and statements of various natural sciences, including ecology. Thus we are able to achieve the study of the economy from a natural and social point of view.

Ecological economics argues that human capital and manufactured capital are complementary to natural capital and substitution is not possible, since human capital and manufactured capital result inevitably from natural capital in one way or another. Ecological economics studies how economic growth is related to the increased exploitation of material and energy inputs. Ecological economists also argue that a significant part of those factors which determine human welfare cannot be examined from a strictly economic point of view, suggesting the multi-disciplinarity of the social and natural sciences as a means to address the study of economic welfare and its dependence on services provided by nature.

Is it an important question to decide whether green economy is a dream or reality? What do the world statistical data show about world development? The IPAT² form of Chertow (2001) pointed out that the global environmental load has increased, because the world population has already exceeded 7 billion, the world economy has quadrupled, and the ecosystem services have been degraded.

The world atlas prepared by SERI (2012) comes to the following conclusions:

- Global material consumption has doubled within the past 30 years. Mankind is becoming more and more dependent on non-renewable materials such as fossil fuels, metals and minerals.
- The world is out of balance: 18 countries consume more than three quarters of global resource use while the 100 least-consuming countries are only responsible for the 1.5 percent of the resource usage.
- An average Austrian consumes 10.2 tons of resources a year while people in most of the other countries consume much less.
- Never before in mankind's history have so many resources been traded globally: in the future Europe will have to face increased competition in the market for raw materials – mainly fossil fuels and metals.
- The high living standard (wellbeing) in Europe is significantly based on the raw materials imported from other continents – including all the negative impacts on those regions.
- Across all categories, Europe is the country most dependent on resource imports.

The current state of worldwide urban development is depressing. It has not been moving toward sustainable design and the consumption has not been reduced quickly

enough. If the goal is to achieve zero emissions, first of all the attitude and behaviour of mankind should change significantly to decrease the resource consumption and to reach higher efficiency (IEA 2013).

The energy sector presents a particular challenge in which to achieve green growth, mainly because of its size, complexity, path dependency and reliance on long-lived assets. Green development has been built on eco-innovations which at the same time can reflect the developing economic results and the preservation and stabilisation of biodiversity. Parallel with these multicultural values are assumed as well: a high degree of solidarity and respect for one another.

The Green Development Initiative is aimed only at the stability of land use and biodiversity by allowing the stakeholders to be responsible for land use in their territory, especially paying attention to biodiversity.

Green development is based more on eco-innovation than green economic growth. Green development would like to increase employment through an environment friendly economy and by reducing chronic poverty. Eco-innovation has an impact on the economy, society and the element of natural environment. It will appear in the stimulation of development along three dimensions as goals, mechanisms and effects.

FINAL CONCLUSION

The transition to green economy results in structural change and some economic benefits are also considered to follow: increase of exports to developing countries, growth in case of environmental goods and services, growth of GDP (Cosbey 2012). But there are some risks as well.

The United Nations Conference on Sustainable Development, also known as Rio+20 or “Earth Summit 2012”, was the third international conference on sustainable development aimed at reconciling the economic and environmental goals of the global community. The Rio+20 Conference was the 20-year follow-up of the 1992 Earth Summit. The main objective of the summit was to create a focused political document designed to shape global environmental policy. The two main discussions were: (1) how to improve international coordination for sustainable development by building an institutional framework, (2) and how to build a green economy to achieve sustainable development and lift people out of poverty, including support for developing countries that will allow them to find a green path for development.

² Impact = Population * Affluence
(consumption/person) * Technology (impact/consumption)

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