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CONTENT

1. ABSTRACT

Serbia facing great problems in its economy which is inefficient and not competitive in global market. Low level of GDP, as a consequence, is one of the major challenges that government faces. On the other side, contemporary agenda requires to solve problems in various areas such as alternative energy sources, resource efficiency and environmental rehabilitation. The government efforts were fruitful mainly in legislation area without visible achievement in their implementation in practice.

As a major problem in uptake and then support eco-innovation is lack of awareness what eco-innovation really is, in various social sectors such as: governmental, business and households as well. Even governments on different levels collect taxes in environment protection area that budgets are not being spent on solving problems in relevant area but they are rather redirected to the other purposes.

This report analyses the environment for eco- innovation in Serbia and it has been focused on 4 key fields intertwined within the concept of eco-innovation:

- Innovation
- Energy sources and efficiency
- Environmental protection
- Socio-economic and demographic specifics.

In all of above mentioned fields numerous indicators are presented and assessed as an *obstacle* or as an *opportunity* to introduce the eco-innovation concept in Serbia.

For most indicators presented in this report Serbia is far behind EU-28 countries as well as Danube region countries. Particularly bad figures are related to: Private sector R&D expenditure, Total intramural R&D expenditure by sectors of performance (GERD), Energy dependence, Energy intensity of the economy, Environmental protection expenditure, Resources productivity, Recycling rate of municipal waste and GDP at market prices in PPS. However, there are fields where Serbia has relatively good figures, such as: Employment in Knowledge Intensive Activities (KIA), Renewable energy in gross final energy consumption, Electricity generated from renewables, Environmental taxes revenues and Economic sentiment. After all, there are many fields where Serbia has no official statistics what is huge disadvantage leaving no room to create any reliable policy in eco-innovation area.

This report is just first of three national reports that will be prepared in order to analyse the situation in eco-innovation area in Serbia and as a basis to underline fields where is necessary to undertake various activities in order to improve situation in them.

2. OVERALL NATIONAL RANKING

This section provides an overview of the national ranking according to 2 main composite indexes applied within the methodology, such as:

1. Summary Innovation Index
2. Eco-innovation index

2.1. European Innovation Scoreboard

For innovation index, the national rankings are calculated and presented within the ***European Innovation Scoreboard 2017 database***, where are shown relative performances as compared to EU in 2010.[1]

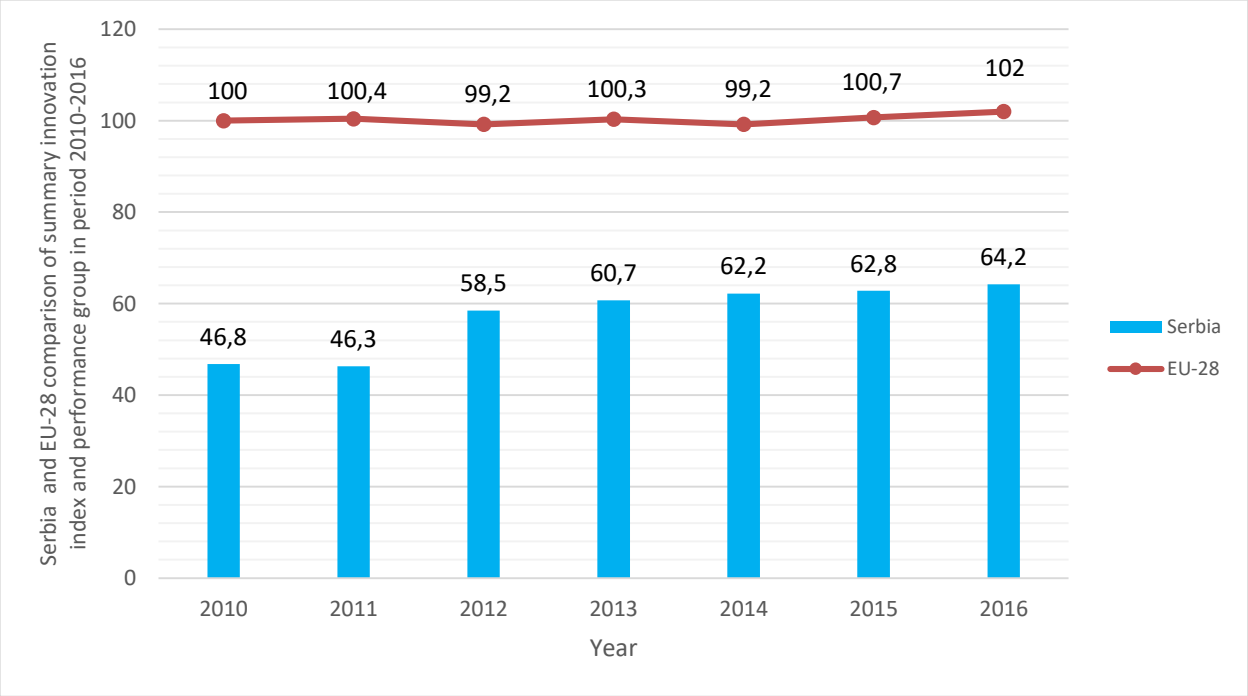

Figure: Serbia and EU-28 comparison on summary innovation index in period 2010-2016

Serbia is a Moderate Innovator. Its performance relative to EU has increased strongly in recent years. Serbia joined to this performance group in year 2012 with significant improvement of 26.35% comparing to the 2011. Over time, performance has increased by 17.3% relative to that of the EU in 2010. [2] During this period, the greatest improvement has been noticed in firm investments (51.7%), and human resources (48.7%). These huge improvements could be explained with very modest starting position in year 2010. On the other hand, the worst performances have been noticed in finance and support. However, Serbia is still performing below the EU average for nearly all

[1] European Innovation Scoreboard: https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en, Internet: October 29th, 2017

[2] EC: European Commission (2017). *European Innovation Scoreboard 2017 – Main report, p.74*

dimensions and indicators. Generally speaking, relative strengths of the innovation system are in Firm investments, Employment impacts, and Innovators. Relative weaknesses are in Intellectual assets, Innovation-friendly environment, and Linkages.

Notable structural differences are a smaller share of employment in Services, lower buyer sophistication, lower GDP per capita, a lower growth rate of GDP, a lower and negative growth rate of population, and lower population density.

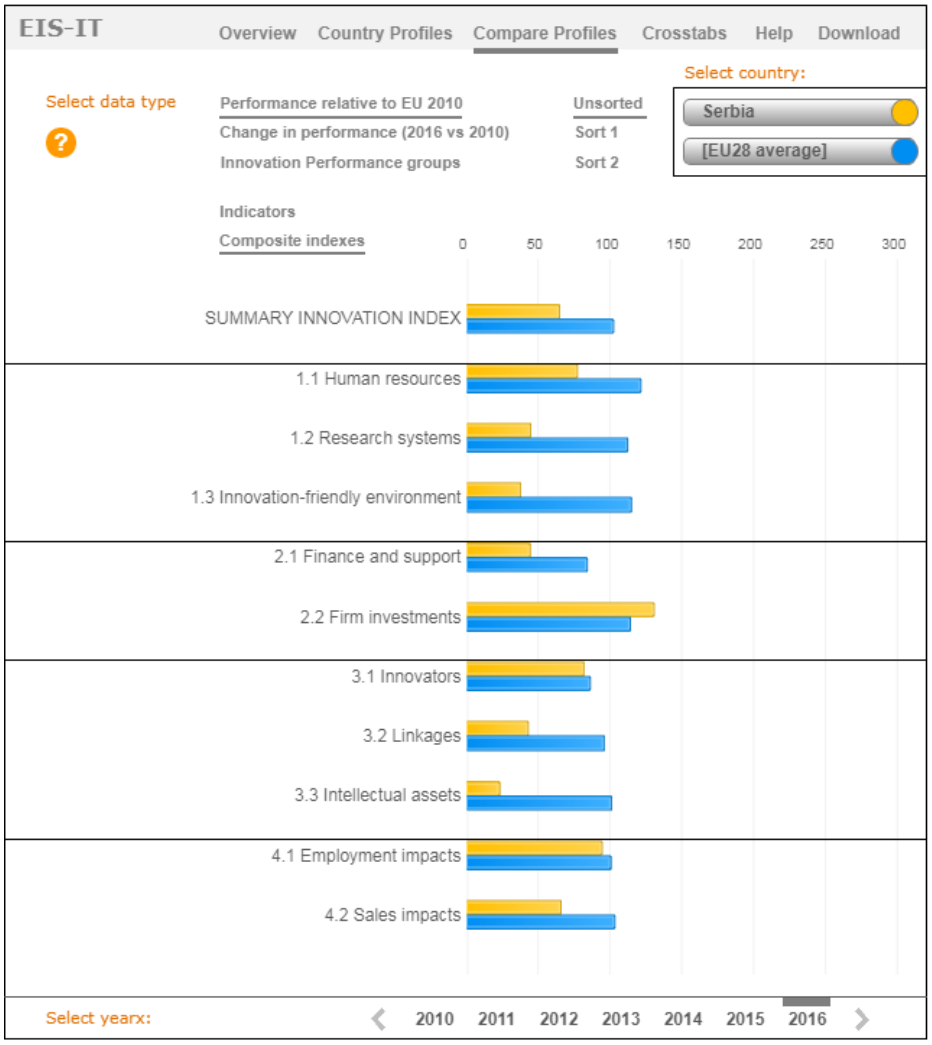

Figure: Summary innovation index and its sub-indexes for Serbia compared to the EU-28 in 2010, for 2016[3]

Next figure presents comparison between Serbia and EU-28 by every available indicator which generates all sub-indexes as well as summary innovation index. There are 27 indicators in total and for Serbia are available data only for 23 of them. Some of them will be described in detail in the next chapter: Innovation. The figure suggests that Serbia has the best overall performance in Non-R&D innovation expenditures from one side, and the worst overall performance is relating to venture capital availability as well as to number of design applications.

[3] European Innovation Scoreboard Interactive Tool (EIS-IT), downloaded on October 28th, 2017 from https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en

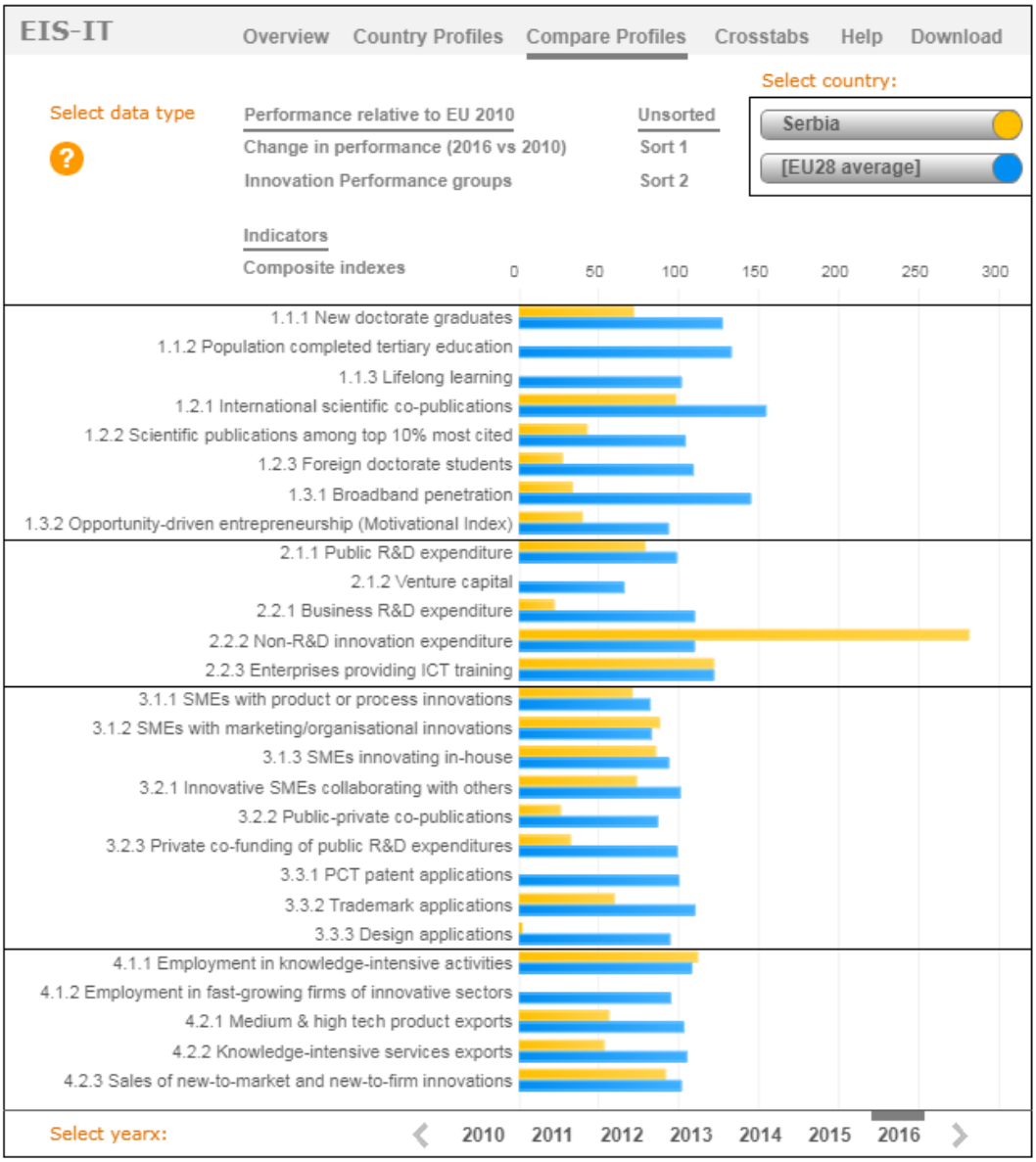

Figure: Summary of innovation indicators for Serbia compared to the EU-28 in 2010, for 2016[4]

2.2. Eco-Innovation Scoreboard

The second composite index taken into the account in this Report is **Eco-innovation index**. The Eco-Innovation Scoreboard (Eco-IS) and the Eco-Innovation Index illustrate eco-innovation performance across the EU Member States. So far, there are no official data for Serbia performance relating this index and its sub-indexes. However, some kind of comparison could be made with EU countries that are in the same performance group as Serbia, moderate innovator (MI).

[4] European Innovation Scoreboard Interactive Tool (EIS-IT), downloaded on October 28th, 2017 from https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en

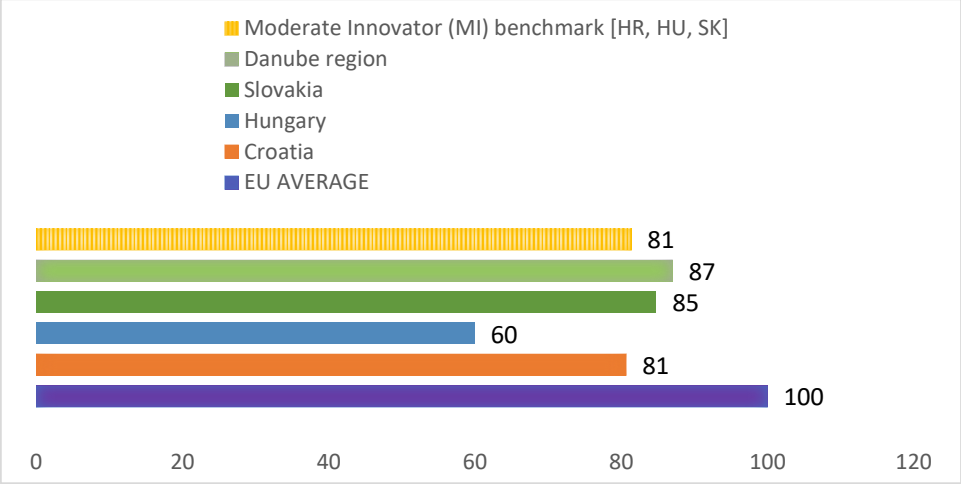

Figure: Eco-innovation index for 3 EU countries from same performance group as Serbia compared to the EU and Danube region in 2016[5]

Moderate innovator countries from Danube region (Croatia, Hungary and Slovakia), are far behind EU average and slightly behind those in Danube region. Relating to lack of official statistics it could be assessed as huge obstacle in order to measure Serbian performance in area of eco-innovation.

2.3. Global Innovation Index (GII)[6]

Nowadays innovations are recognized as main drivers of economic growth and development. Therefore the information on innovation performance gains significance for ranking the world's countries and economics. The global innovation index (GII) aims to capture different prospects of innovation by providing a database of detailed metrics about the innovation performance of countries and economies around the world. GII indicators (81) explore extensive vision of innovation, which results in the overall GII score – a simple average of the Input and Output Sub-Index scores.

Table 1: *European two best, European two the worst and MI countries comparison with Serbia on GII for 2017 and 2016*

Country	Score (0-100)	GII Rank (1-127)	Income	Rank (among same IGC)	Efficiency Ratio	Rank	GII Rank 2016 (1-128)
Switzerland	67.69	1	HI	1	0.95	2	1
Sweden	63.82	2	HI	2	0.83	12	2
Czech Republic (MI)	50.98	24	HI	23	0.83	13	27
Slovakia (MI)	43.43	34	HI	33	0.75	25	37
Hungary (MI)	41.74	39	HI	36	0.73	30	33
Croatia (MI)	39.80	41	HI	38	0.66	52	47
SERBIA (MI)	**35.34**	**62**	**UM**	**13**	**0.61**	**67**	**65**
Belarus	29.98	88	UM	30	0.39	120	79
Albania	28.86	93	UM	33	0.37	122	92

Notes: 1) World Bank Income Group Classification (IGC): LI = low income; LM = lower-middle income; UM = upper-middle income; and HI = high income; 2) 127 world countries are taken into account.

[5] Source: https://ec.europa.eu/environment/ecoap/indicators/index_en
[6] Source: https://www.globalinnovationindex.org/

Total of 81 GII indicators are classified in 21 sub-pillars and 7 pillars. The main values for Serbia are presented in the table below.

Table 2: *GII with its sub-indexes for Serbia and its pillars values compared with Czech Republic*

Index/sub-index/pillar	Score (0-100)		Rank (1-127)	
	Serbia	Czech R.	Serbia	Czech R.
Global innovation index	**35.3**	**51.0**	**62**	**16***
Innovation Output Sub-index	26.9	46.2	61	13
Innovation Input Sub-index	43.8	55.7	58	27
Innovation Efficiency Ratio	0.6	0.8	67	13*
Global innovation index 2016	33.8	49.4	65	27
PILLARS				
Institutions	67.7	77.6	50	30
Human capital&Research	33.9	47.6	54	30
Infrastructure	49.7	57.3	52	30
Market sophistication	38.7	50.2	99	47
Business sophistication	28.9	45.9	79	26
Knowledge&Tehnology outputs	24.7	45.8	53	14*
Creative outputs	29.1	46.7	70	22

Note:
** mark indicates a strength*

By comparing Serbia and Czech Republic GII values[7] data suggest that while Czech Republic has strengths on index and sub-index levels, Serbia has its strengths only at 10 indicators but also has weaknesses at 10 indicators as well as at the sub-pillar Trade, competition and market scale which is under the Market sophistication sub-pillar.

3. INNOVATION

Encouraging and stimulating innovation is one of the main objectives of European policies. Innovation forms part of the Europe 2020 strategy for its role in creating job opportunities, making enterprises more competitive in the global market, improving the quality of life and in contributing to a more sustainable growth. During the period 2010–12, almost half of all enterprises in the EU-28 reported innovation activity (48.9 %) what is a decrease in share of innovative enterprises by 3.9 percentage points comparing to the period 2008–10.[8]

3.1. THE EUROPEAN INNOVATION SCOREBOARD

In the Table 3 are presented indexes for Serbia in years 2010 and 2016 with change in that period according to European Innovation Scoreboard. From the table is obvious that Serbia performs far behind EU-28 average in almost every of given indicator. Few indicators that are better or at least comparable with EU-28 average are: Non R&D innovation expenditures, Enterprises providing ICT training, Employment in knowledge-intensive activities and Sales of new-to-market/firm innovations.

[7] Source: The Global Innovation Index 2017: Innovation Feeding the World
[8] EUROSTAT (2017). *Key figures on Europe: 2016 edition*.

Table 2: *European Innovation Scoreboard 2017 - Serbia*[9]

	Performance relative to EU in year		Change 2010-2016
	2010	2016	
SUMMARY INNOVATION INDEX	**46.8**	**64.2**	**17.3**
FRAMEWORK CONDITIONS			
Human Resources	**28.1**	**76.8**	**48.7**
New doctorate graduates	26.2	71.5	45.4
Population with tertiary education	N/A	N/A	N/A
Lifelong learning	N/A	N/A	N/A
Attractive research system	**30.5**	**44.1**	**13.6**
International scientific co-publications	46.8	97.8	51.0
Most cited publications	33.7	42.7	9.0
Foreign doctorate students	20.2	27.0	6.8
Innovation friendly environment	**39.2**	**37.0**	**-2.2**
Broadband penetration	33.3	33.3	0.0
Opportunity driven entrepreneurship	43.4	39.5	-3.8
INVESTMENTS			
Finance and support	**66.9**	**43.9**	**-23.0**
R&D expenditure in the public sector	103.9	78.7	-25.2
Venture capital expenditures	20.2	0.0	-20.2
Firm investments	**78.5**	**130.2**	**51.7**
R&D expenditure in the business sector	8.5	21.9	13.4
Non R&D innovation expenditures	116.1	280.8	164.7
Enterprises providing ICT training	121.4	121.4	0.0
INNOVATION ACTIVITIES			
Innovators	**46.8**	**81.2**	**34.4**
SMEs product/process innovations	27.7	70.6	42.9
SMEs marketing/organisational innovations	23.8	87.7	63.8
SMEs innovating in-house	89.0	85.1	-3.9
Linkages	**31.0**	**42.6**	**11.6**
Innovative SMEs collaborating with others	23.1	73.2	50.1
Public-private co-publications	37.4	25.8	-11.6
Private co-funding of public R&D expenditure	32.0	32.0	0.0
Intellectual assets	**24.1**	**22.7**	**-1.4**
PCT patent applications	N/A	N/A	N/A
Trademark applications	65.4	59.3	-6.1
Design applications	0.0	1.7	1.7
IMPACTS			
Employment impacts	71.6	94.0	22.4
Employment in knowledge-intensive activities	84.9	111.4	26.5
Employment in fast growing enterprises	N/A	N/A	N/A
Sales impacts	45.4	65.3	19.9
Medium and high tech products exports	20.0	55.8	35.8
Knowledge intensive services exports	52.5	52.9	0.5
Sales of new-to-market/firm innovations	67.9	91.2	23.4

Notes:

- *Dark green: normalised performance above 120% of EU;*
- *Light green: normalised performance between 90% and 120% of EU;*
- *Yellow: normalised performance between 50% and 90% of EU;*
- *Orange: normalised performance below 50% of EU.*
- *Change highlighted in green is positive; change highlighted in light red is negative*

[9] Source: http://ec.europa.eu/docsroom/documents/23937

On the following pages, are presented and described selected indicators for Serbia according to European Innovation Scoreboard 2017 Database.[10]

3.1.1. Framework conditions

Eight indicators have been introduced to measure innovation activity of the country. Serbia is far behind or at least behind EU-28 countries as well Danube region ones relating to six indicators: New doctorate graduates, International scientific co-publications, Scientific publications among the top 10% most cited publications worldwide, Foreign doctorate students, Broadband penetration, Opportunity-driven entrepreneurship. Remaining two indicators are missing for Serbia.

Indicator: New doctorate graduates per 1000 population aged 25-34[11]

New doctorate graduates in Serbia aged 25-34 are far behind comparing to the countries in same performance group: Moderate innovators (HR, HU, SK and CZ), 1.13 to 1.53. When it is compared to the EU (1.88) or Danube region (1.85) average data are more unfavourable. However, comparing data during the whole respective period, since 2008 (0.51), situation has been improved significantly.

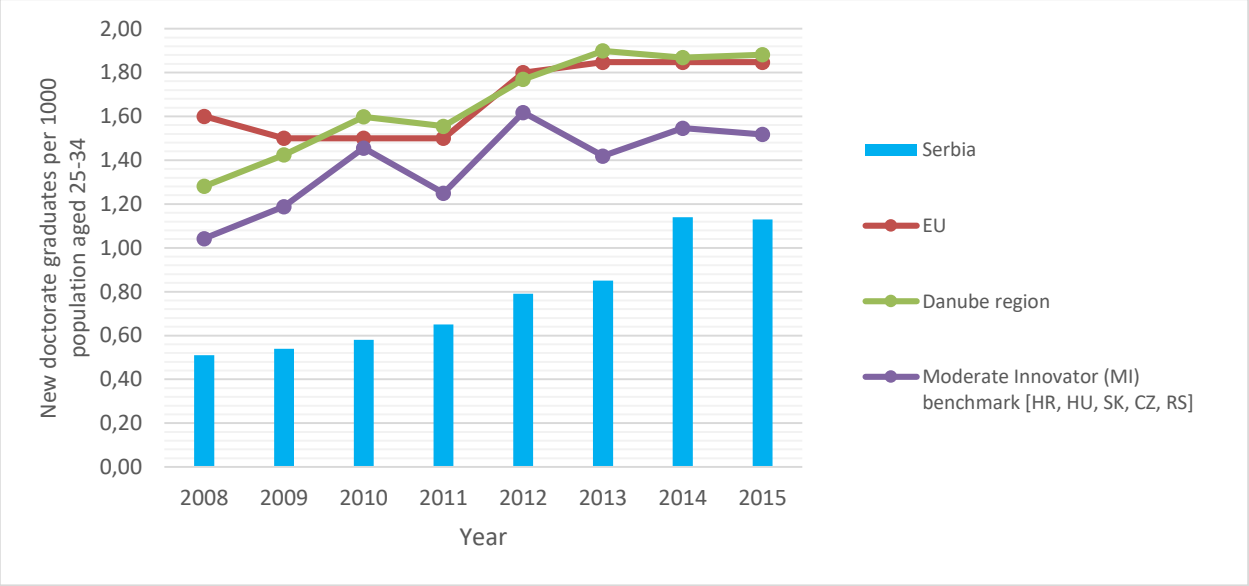

Figure: New doctorate graduates per 1000 population aged 25-34 indicator in Serbia compared to MI benchmark, and the average of the EU and Danube region

Taking into account total number of new doctorate graduates regardless age group in period 2007-2016 real boom happened relating this issue, because this number increased almost 10 times. In recent years this trend got big publicity and often has been commented in public as a distorted image of Serbian university education rather than its real success.

[10] http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en
[11] European Innovation Scoreboard 2017 Database - Indicator 1.1.1

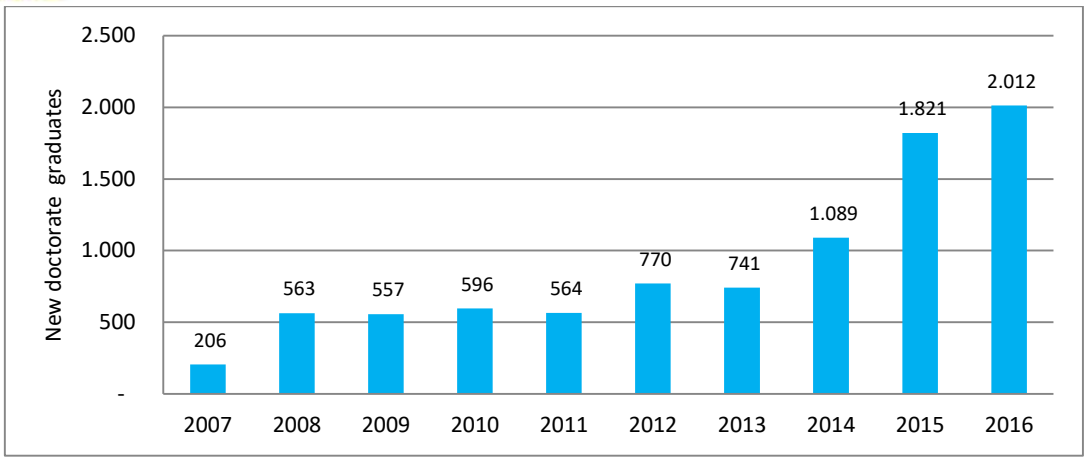

Figure: New doctorate graduates in Serbia for period 2007-2016[12]

OBSTACLE: A real flood of new doctorate graduates in Serbia hasn't so much with quality of university education. It is rather some kind of fashion among new elite that has been created in last decades. In long term this trend will additionally spoil already derogated picture of Serbian university education and will have negative influence on ranking of its universities on relevant world lists.

Indicator: International scientific co-publications per million population[13]

Regarding international scientific co-publications Serbia is also far behind EU and Danube region average like it is when new doctorate graduates re considered. During the referent period 2009-16, Serbia doubled its production in this area, while Danube region and EU countries increased this kind of production "only" for 56.60% and 64.95% respectively.

The number of research papers (projects and studies) increased in 2014 by approximately 6.32%, when compared with 2013, in which the share of basic works was 57%, of applied works 29%, and of experimental works 14%.[14]

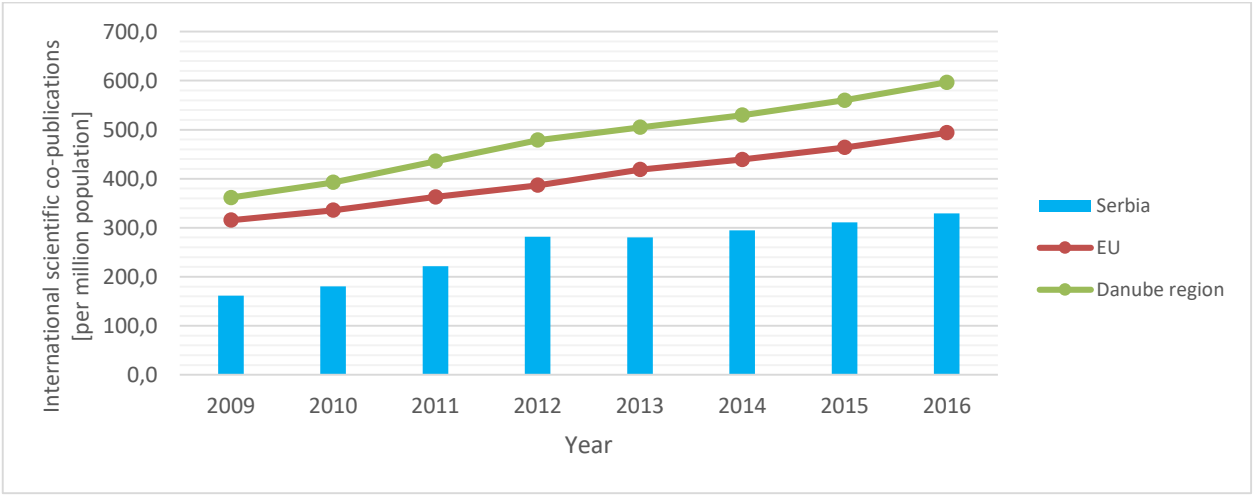

Figure: International scientific co-publications in Serbia compared to the average of the EU and Danube region

[12] Source: Statistical Office of the Republic of Serbia
[13] European Innovation Scoreboard 2017 Database - Indicator 1.2.1
[14] Statistical Yearbook of Republic of Serbia 2016, Statistical Office of the Republic of Serbia

OBSTACLE: By relatively huge difference in international scientific co-publications Serbia will remain at the margins in scientific world. Its R&D sector will disappear in long term with no hope to implement domestic knowledge neither in economy nor to other social areas. Scientist will continue to leave the country that will become place with cheap work force.

Indicator: Scientific publications among the top 10% most cited publications[15]

This is the second indicator on the publications output. According to it Serbia is also far behind Danube region countries average and even more behind EU countries average. While Danube region figures slightly increased between 6.5% in 2008 and 7.0 in 2015, on EU level the same trend has been observed but with higher values, 10.0% in 2008-2009 and 10.6% in 2015. During the same referent period figures for Serbia vary between 4.4 in 2013 and 5.4% in 2001.

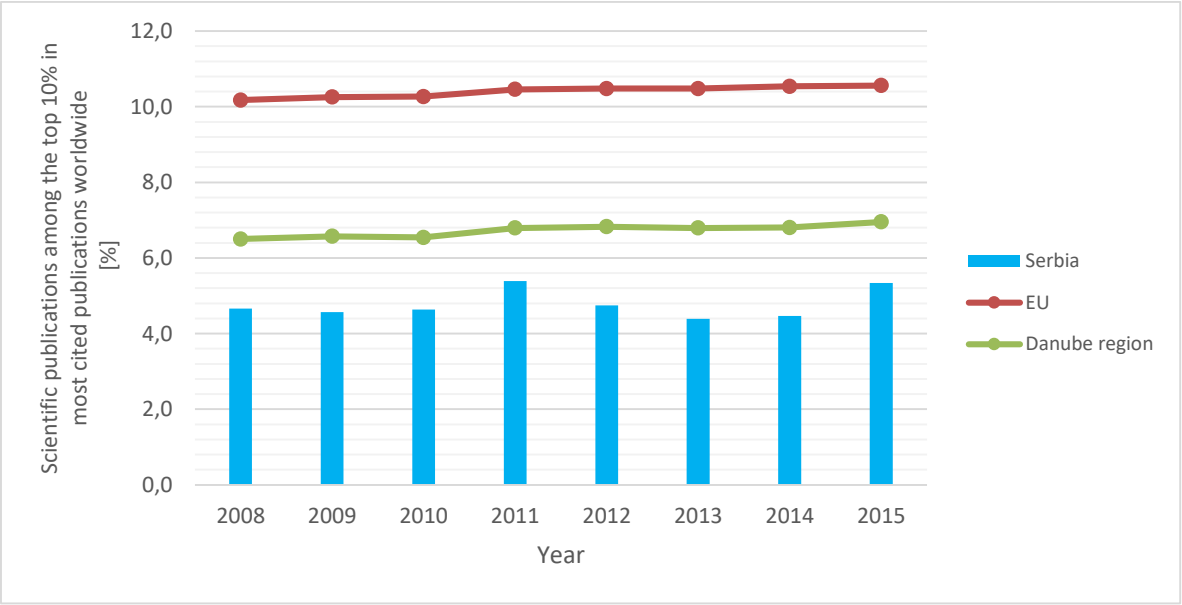

Figure: Scientific publications in Serbia among the top 10% most cited publications to the average of the EU and Danube region

OBSTACLE: About doubled figures on EU level in comparison to Serbia relating to scientific publications in the best publications worldwide suggest that country is on the periphery of R&D world and hardly could translate its research outputs into patents and particularly into their commercialization.

Indicator: Opportunity-driven entrepreneurship[16]

This indicator puts in relation improvement-driven entrepreneurship with necessity-driven entrepreneurship. Namely, that is a ratio between those who are driven with the opportunity to become independent and raising the income with those who have no other option (i.e. lost previous

[15] European Innovation Scoreboard 2017 Database - Indicator 1.2.2
[16] European Innovation Scoreboard 2017 Database - Indicator 1.3.2

job) but to run own business. If in the country prevails those who are improvement-driven than conditions for entrepreneurship in it seem to be favourable.

On Danube region countries average as well as on EU average this indicator decreasing during the referent period, but figures are still favourable in comparison to Serbia. During the referent period Serbian figures vary between 1.0 in 2009 and 1.2 in 2010. In period 2011-2016 this index is stabilized at 1.1.

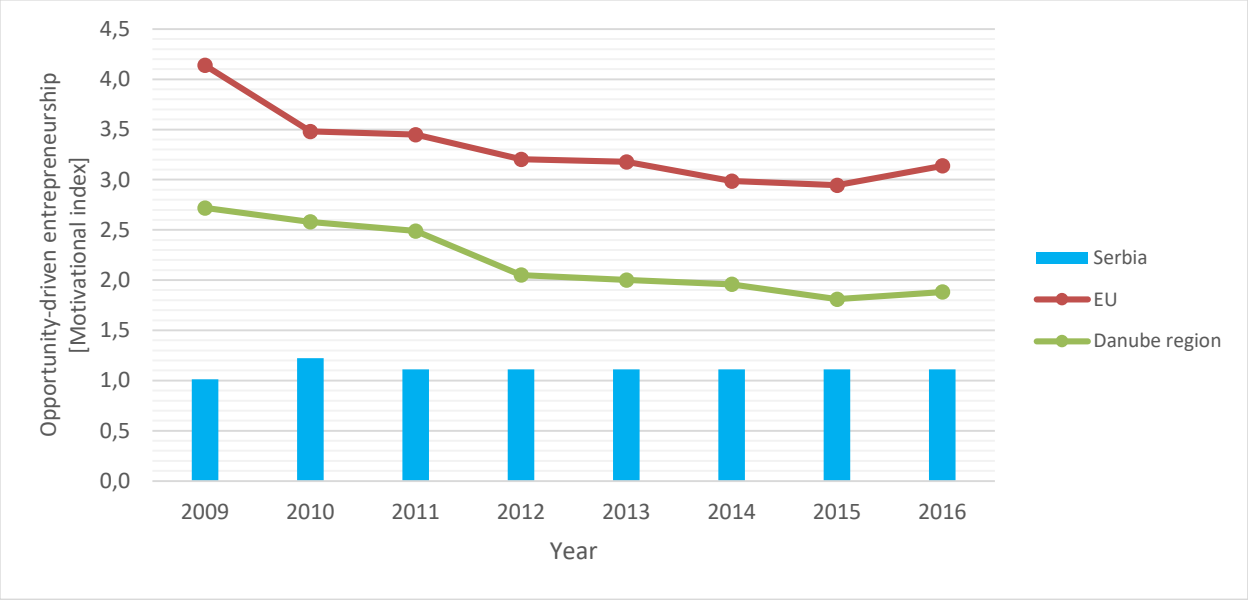

Figure: Opportunity driven entrepreneurship in Serbia to the average of the EU and Danube region

OBSTACLE: Low level of this indicator in combination with its stable value suggests that in Serbia for long period there were no favourable environment for real entrepreneurship. The level of those who are improvement driven is low in comparison to those who are somehow forced to run their business. In such circumstances there are small rooms for innovations and particularly for eco-innovations.

3.1.2. Investments

Five indicators have been introduced to measure innovation activity of the country. Serbia performs much better than EU-28 and Danube region average in Non-R&D innovation expenditures but only better in comparison to Danube region average when it comes to Enterprises providing training to develop or upgrade ICT skills of their personnel. The country is far behind in its performance in relation to EU-28 and Danube region average for Venture capital investments and R&D expenditure in the business sector.

Indicator: Public R&D expenditure in the public sector as % of GDP[17]

In 2015, Serbia allocated 0.60% of its GDP to fund research and development activities in the public sector, including the government and higher education. This represents only 84.51% of the European Union member states average and exactly the same % like in the Danube region. It is relevant to mention that in year 2008 this indicator was only 0.32% but in the next year rose to 0.74% what was for 0.02% more than at EU level. However, this indicator since 2009 had significantly higher values compared to Danube region countries with an exception in year 2014.

Figure 1 represents the R&D expenditure in the period from 2008 to 2015. The trend for the European Union has stagnated from 2009 with about 0.7% of GDP. On the other side Danube region is demonstrating a trend of substantial growth with an increase of over 18.33% from 2008.

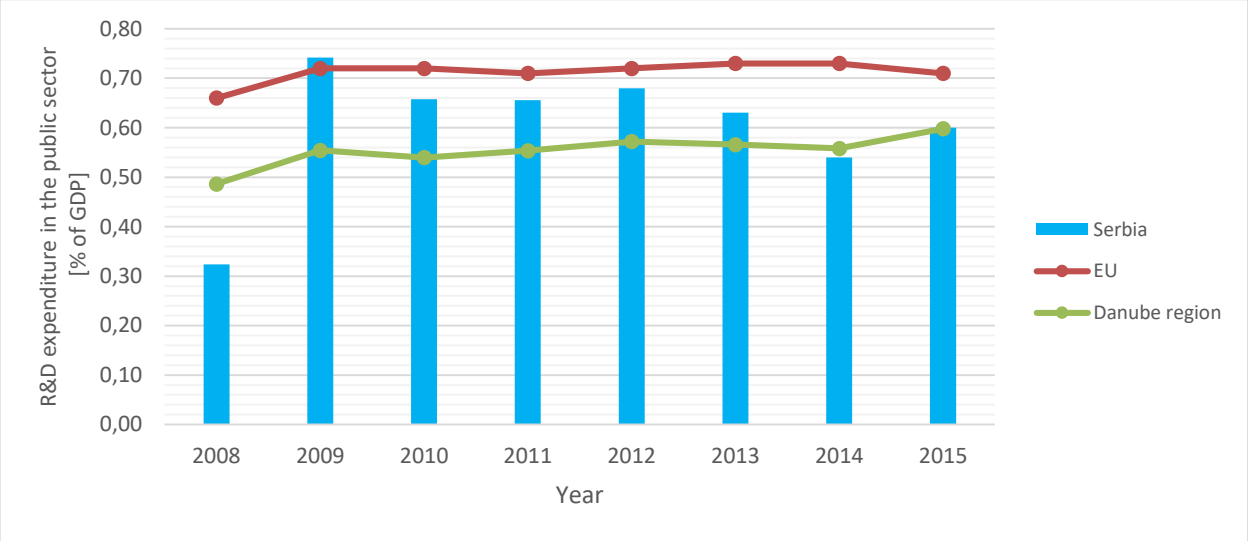

Figure: Public R&D expenditure as % of GDP for Serbia, the European Union and the Danube region

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
EU-28 (1)	3,3	3,1	0,4	-4,4	2,1	1,7	-0,5	0,2	1,6	2,2
Danube region	5,7	5,6	3,7	-5,5	1,5	1,8	-0,5	0,9	1,7	2,6
Serbia	4,9	5,9	5,4	-3,1	0,6	1,4	-1,0	2,6	-1,8	0,8

Figure: Real GDP growth (%) in Serbia, the EU and the Danube region

[17] European Innovation Scoreboard 2017 Database - Indicator 2.1.1

Real GDP growth in Serbia has been varied in comparison to EU and Danube region. In years before the financial crisis it was higher than in these benchmarks even in 2009 when large decline has been noticed. After 2009 this indicator is lower in Serbia with exception in 2013. In terms of the long-term trend, the situation is similar in Serbia and both the European Union as well as the Danube region with significant deviation in year 2014.

OBSTACLE: In comparison to both the EU-28, as well as the Danube region, considering a GDP share of public spending for research and innovation, it`s clear that Serbia is underinvesting in such activities.

Indicator: Private sector R&D expenditure as % of GDP[18]

Serbian R&D expenditure in the private sector was negligible in period 2008-2015. All figures in referent period are incomparable with the European Union's average, which slightly increased from 1.16% in 2008 up to 1.30% in year 2015, while Serbia had 0.05% in 2008 and 0.28% in year 2015. Comparison with Danube region countries shows slightly favourable picture but it is still far behind the average of this group of countries. However, for last two years in referent period (2014 and 2015) data shows some improvements and it could be assessed the beginning of serious increase of this indicator.

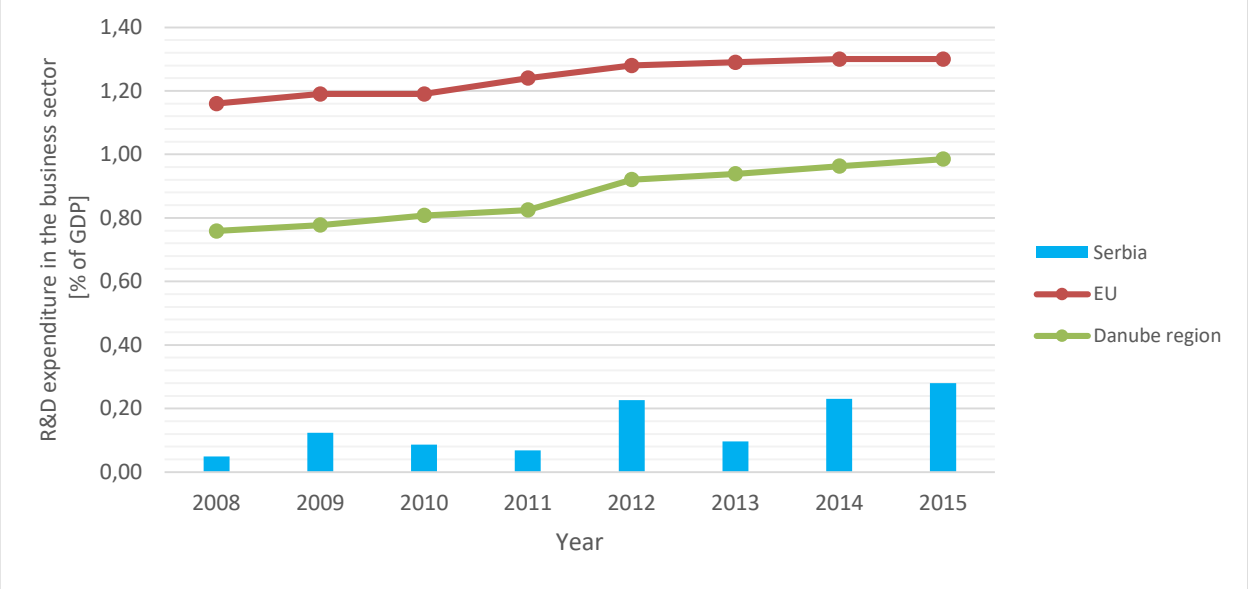

Figure: R&D expenditure of the private sector in Serbia as % of GDP

OBSTACLE: In comparison to both the EU-28, as well as the Danube region, considering a GDP share of private sector spending for R&D, it`s clear that Serbia is seriously underinvesting in such activities.

OPPORTUNITY: Serbian private sector could be additional source for funding R&D activities but it should be recognized from public sector as well. There are large areas of common interest when public funds could be joined by private ones on the basis of public-private partnerships for example.

[18] European Innovation Scoreboard 2017 Database - Indicator 2.2.1

Indicator: Non-R&D innovation expenditures as % of turnover[19]

Beside regular R&D activities there are those which support them, such as: acquisition of advanced machinery, computer hardware and software, patents and licenses, training related to the introduction of new products or processes, market research, feasibility studies, design and production engineering, etc.

From the beginning of the referent period Serbian figures were behind in comparison to the Danube region ones till 2012. Then Serbian index jumped from 0.41% (2012) on 2.82% (2013) at remained significantly higher than that at EU-28 and Danube region level. On EU and Danube region countries level this indicator varied during the referent period. The EU-28 figures varied between 0.57% in 2011-2012 and 0.76% in 2015. The Danube region figures varied between 0.53% in 2011-2012 and 0.91% in 2008 and 2013-2014.

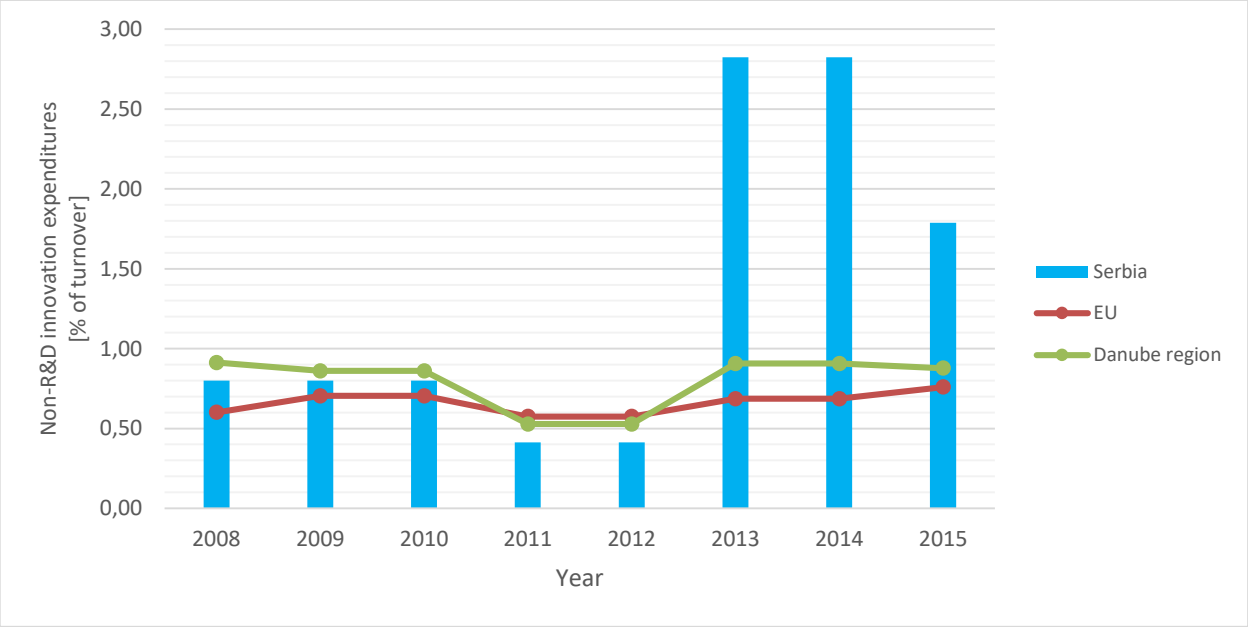

Figure: Non-R&D expenditure innovation expenditure in Serbia in comparison to EU and Danube region countries

OPPORTUNITY: Serbian non-R&D innovation expenditures are significantly higher than those in EU-28 as well as Danube region countries. By keeping this indicator on high level country could build the solid base for R&D innovations in the future.

Indicator: Enterprises providing training to develop or upgrade ICT skills of their personnel[20]

In the area of upgrading ICT skills in providing training by enterprises Serbia performs very well in comparison to EU-28 and particularly to Danube region countries. However, so high 22% of enterprises who provide ICT trainings during the whole referent period 2008-2015 raise doubts on methodology implemented.

[19] European Innovation Scoreboard 2017 Database - Indicator 2.2.2
[20] European Innovation Scoreboard 2017 Database - Indicator 2.2.3

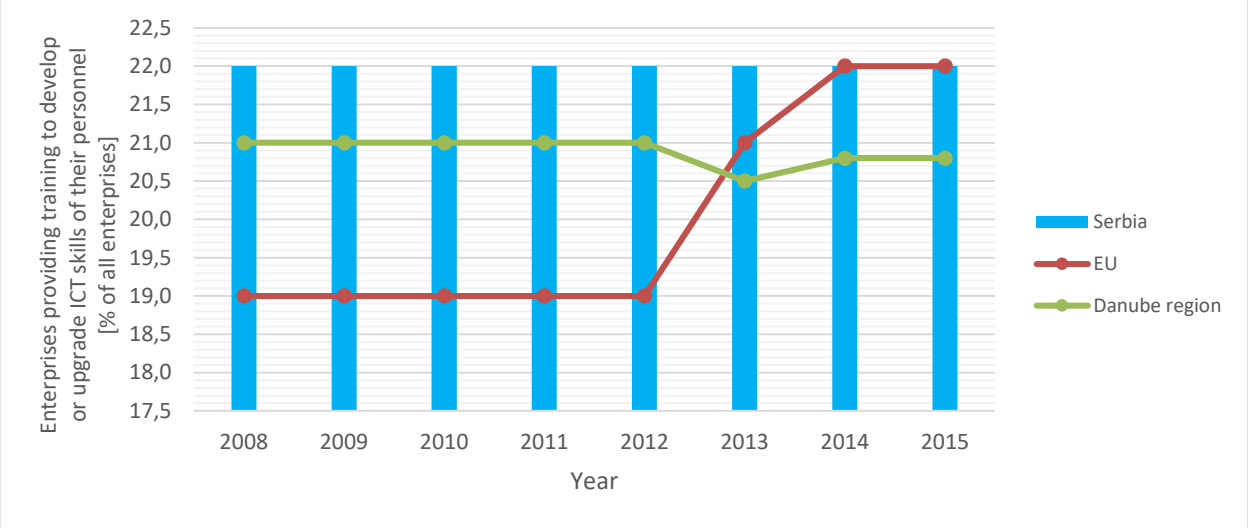

Figure: Enterprises providing training to develop or upgrade ICT skills of their personnel Serbia vs. EU and Danube region

OPPORTUNITY: Generally speaking, Serbia is recognised as a country where computer literacy is on high level. Beside the basic literacy, there are numerous worldwide competitive enterprises in ICT sector. This is a great opportunity for developing innovations leaning on already developed human resources and Serbian enterprises should continue to support this in the future as well.

3.1.3. Innovation activities

Nine indicators have been introduced to measure innovation activity of the country. Serbia is far behind EU-28 countries as well Danube region ones or even the indicator is missing. At least in 2015 Serbia performed better than EU-28 and Danube region countries only in SMEs introducing marketing or organisational innovations and better just in comparison to Danube region countries in both, SMEs introducing product or process innovations and SMEs innovating in-house.

Indicator: SMEs introducing product or process innovations[21]

In the area of SMEs introducing product or process innovations Serbia is comparable to EU-28 as well as to Danube Region countries. At the beginning of the referent period, in 2008, Serbia with 18.3% was far behind EU-28 (34.5%) and Danube region average (28.6%) and figures were same till 2011. In 2011 Serbian index almost doubled at 36.1% what was higher in comparison to EU-28 for 2.6% and for 7.5% in comparison to Danube region average. The same figures were observed in 2012. Then, since 2013 Serbian index has fallen on 28.6% as well as indexes for the EU-28 (30.6%) and for the Danube Region (23.7%). At the end of the reference period in 2015, Serbian indicator (28.3%) was between EU-28 (30.9%) and Danube region average (24.6%).

[21] European Innovation Scoreboard 2017 Database - Indicator 3.1.1

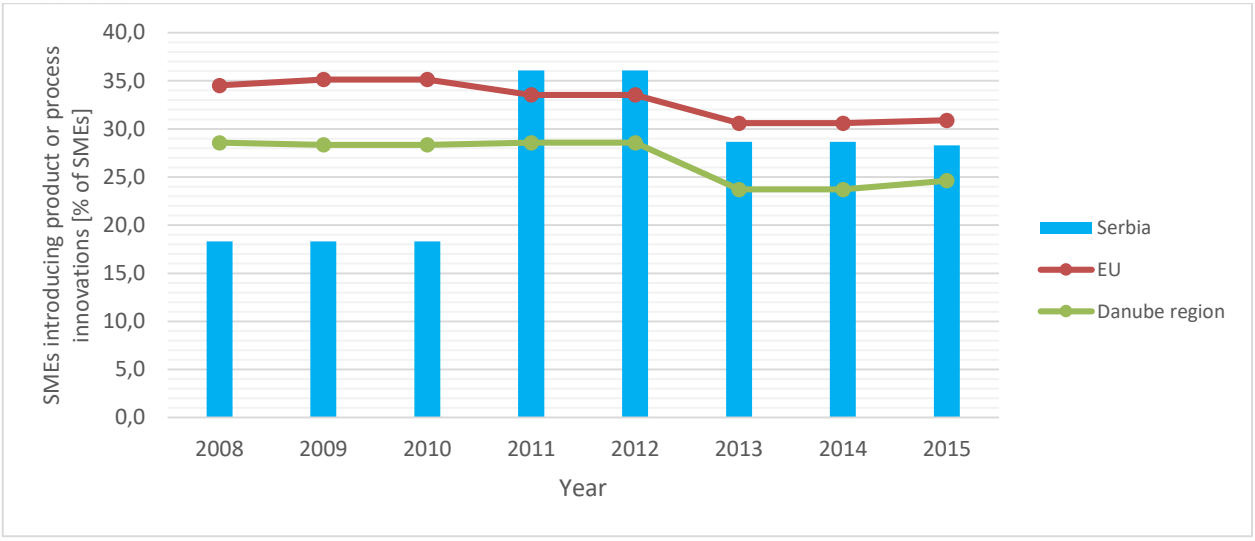

Figure: SMEs introducing product or process innovation in Serbia in comparison to EU and Danube region countries

OPPORTUNITY: Generally speaking, product and process related innovations are the key to innovation in manufacturing activities. Serbian SMEs noticed these kinds of innovations at very decent level in comparison to EU-28 and particularly in comparison to Danube region countries, what is the best way to become competitive in the market. Country should support these activities in order to push up its economy in general.

Indicator: SMEs introducing marketing or organisational innovations[22]

Since 2011, in the area of SMEs introducing marketing or organisational innovations Serbia performs better than EU-28 as well as Danube Region countries. Serbia achieved the maximum in 2011and 2012 with 42.4% of SMEs who were introducing marketing or organisational innovations, while at EU-28 level it was 39.8% and 34.7% at Danube region countries average. Despite the index is falling since 2012 and in 2015 was 36.4%, it still remained better than at EU-28 (34.9%) and particularly in comparison to Danube region where it was 28.3%.

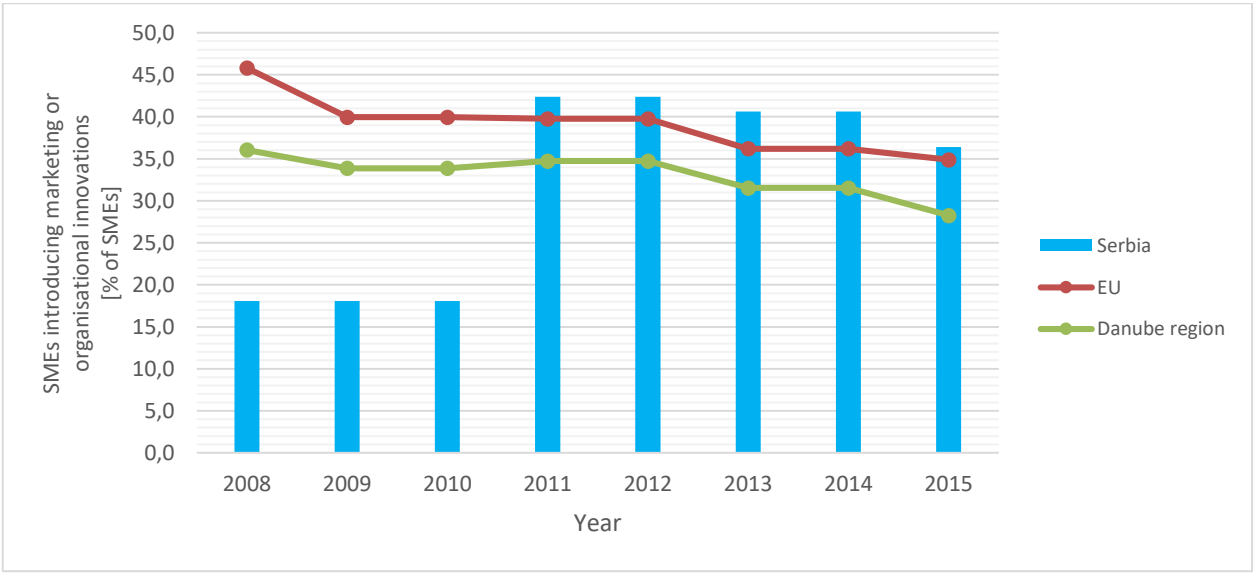

Figure: SMEs introducing marketing or organisational innovation in Serbia in comparison to EU and Danube region countries

[22] European Innovation Scoreboard 2017 Database - Indicator 3.1.2

OPPORTUNITY: Many Serbian SMEs, in particular in the services sectors, innovate through non-technological forms of innovations such as marketing and organisational ones. Relating to this forms of innovations Serbian figures are higher than at EU-28 and Danube region average. Country should support these forms of innovations in order to enhance their SMEs competitiveness or at least to promote non-technological innovation as an alternative for technological ones.

Indicator: SMEs innovating in-house[23]

When it comes to SMEs innovating in-house Serbia is also comparable to EU-28 as well as to Danube Region countries. At the beginning of the referent period, in 2008, Serbia with 27.8% performed better than Danube region average (26.2%) but behind EU-28 (30.9%) and the figures were similar till 2011. In 2011 Serbian index jumped at 33.4% what was higher in comparison to EU-28 for 1.8% and for 8.7 in comparison to Danube region average. The same figures were observed in 2012. Then, since 2013 Serbian index has fallen on 25.2% as well as indexes for the EU-28 (28.7%) and for the Danube Region (21.6%). At the end of the reference period in 2015, Serbian indicator (27.0%) was between EU-28 (28.8%) and Danube region average (21.6%).

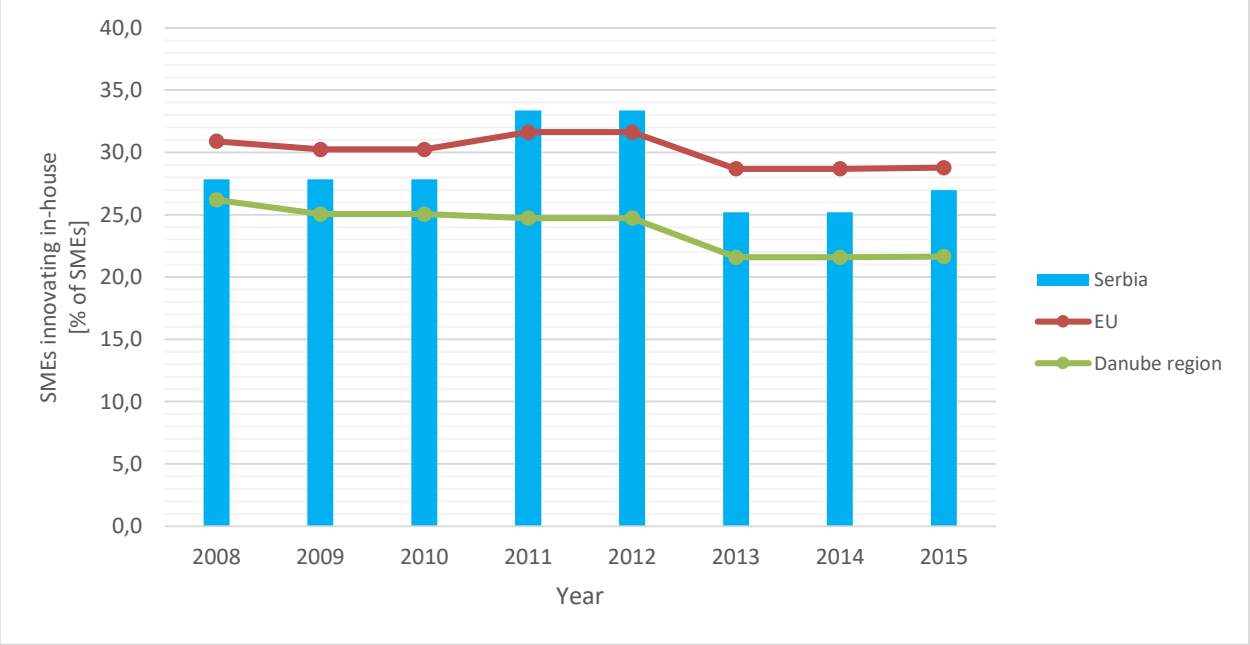

Figure: SMEs innovating in-house in Serbia in comparison to EU and Danube region countries

OPPORTUNITY: Serbia performs well relating to SMEs introducing any new or significantly improved products or production processes, have innovated in-house. In order to enhance this kind of innovations SMEs could establish closer relations with both R&D organisations as well as with tertiary educational institutions.

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[23] European Innovation Scoreboard 2017 Database - Indicator 3.1.3

3.1.4. Impacts

Five indicators have been introduced to measure innovation activity of the country. Serbia performs better than EU-28 and Danube region countries average relating to the Employment in knowledge-intensive activities and performs better relating only to Danube region average when it comes to Knowledge-intensive services exports as percentage of total services exports and Sales of new-to-market and new-to-firm innovations. Serbia is far behind EU-28 countries as well Danube region relating to Exports of medium and high technology products as a share of total product exports. The indicator Employment in fast-growing enterprises is missing for Serbia.

Indicator: Employment in Knowledge Intensive Activities (KIA)[24]

In Serbia, employment in knowledge intensive activities in both manufacturing and services is slightly above the EU average since 2011 and more above comparing to Danube region average during the whole referent period (2008-2015). Since 2008 KIA for Serbia has been increasing from 11.5 up to 14.4 in 2011, when it has stabilised. During the referent period KIA for EU also been increasing, from 11.3 in 2008 till 14.1 in 2015. Increasing trend for KIA may be noticed for Danube region countries also, but their figures are below Serbia and EU average. In year 2015 Serbian KIA was higher for 2.081% in comparison to EU countries average and for 15.28% in comparison to Danube region countries.

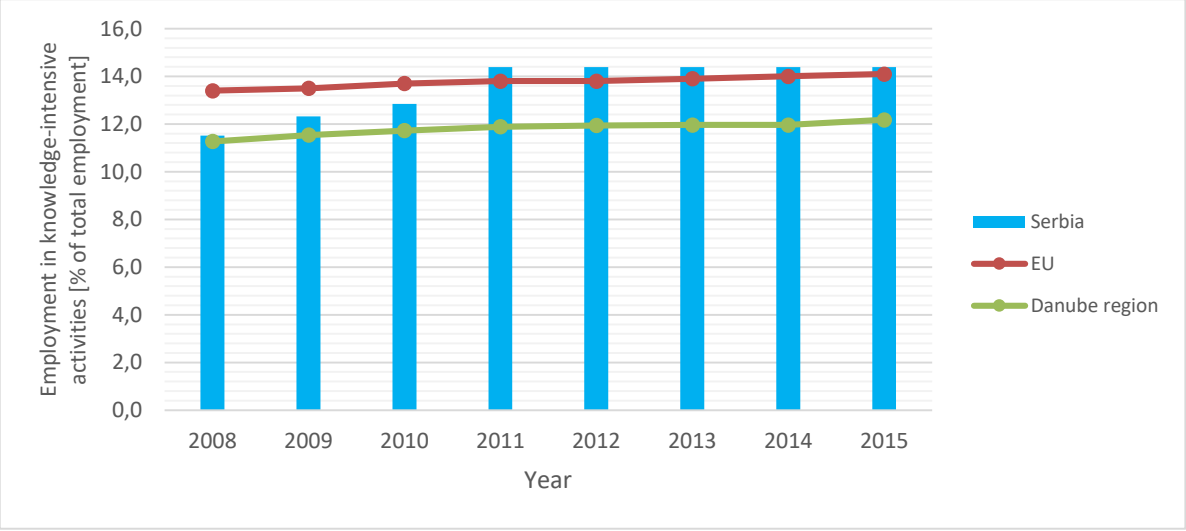

Figure: Employment in Knowledge Intensive Activities (KIA) as a share of total employment in Serbia

OBSTACLE: The level of employment in knowledge intensive activities in both manufacturing and services (as a share of total national employment) is comparable with that of the EU. However, for Serbia this figures is not favourable in full scale because of various reasons. First of all relatively high unemployment rate and factious employment in budget funded organisations could misled in conclusions. As relatively small country with modest budget and resource based economy KIA for Serbia should be higher in order to achieve benefits in the future development of eco-innovative products and services on the country level.

[24] European Innovation Scoreboard 2017 Database - Indicator 4.1.1

Indicator: Exports of medium and high technology products as a share of total product exports[25]

When it comes to exports of medium and high technology products, Serbia Serbian figures are far lower than those at EU-28 and Danube region countries level. At the beginning of the referent period, in 2008, Serbia recorded 27.4% what was less for almost double in comparison to EU-28 (54.4%). The country reached maximum in 2012 with 41.1% what was still far below EU-28 (53.5%) and Danube region average (52.1%). At the end of the referent period Serbia recorded 39.1% while EU-28 average was 56.2% and Danube region average was 54.2% with upward trend for both groups of countries since 2013.

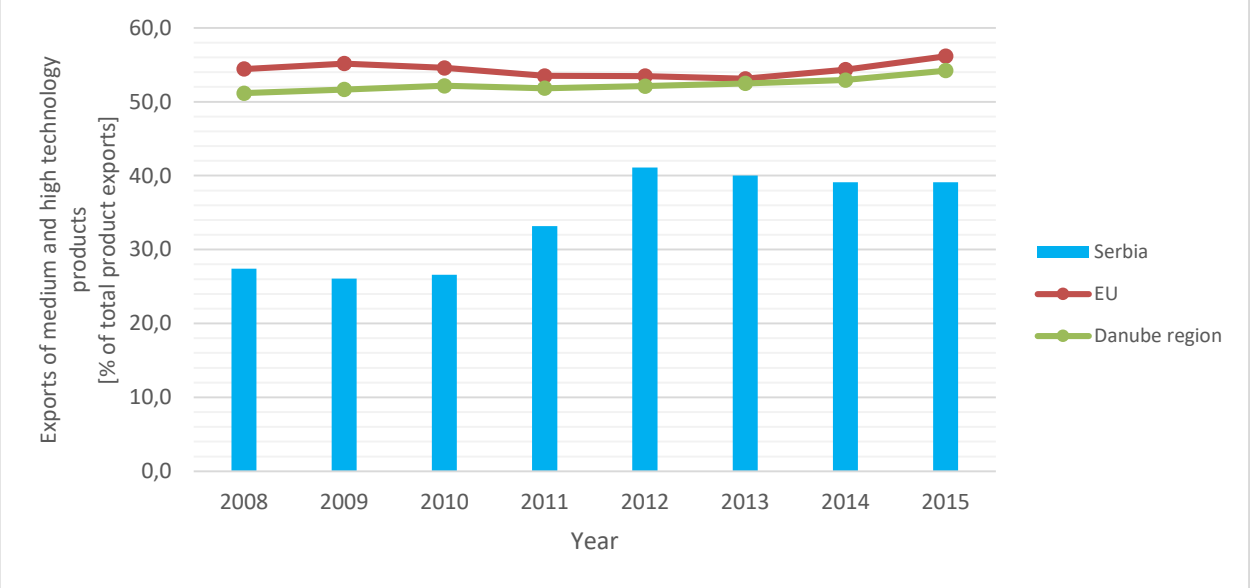

Figure: Exports of medium and high technology products as a share of total employment in Serbia

OBSTACLE: Generally speaking this indicator measures the technological competitiveness of the country as the ability to commercialise the R&D results and innovation in the foreign markets. Obviously, Serbia doesn't perform well what means there is a lack of commercialised medium and high technology products as an ultimate phase in R&D related process, in a broader sense. Finally, this fact puts Serbia in unfavourable position to import these kinds of products rather than to export them leaving its economy uncompetitive.

3.2. THE ECO-INNOVATION SCOREBOARD AND ECO-INNOVATION INDEX

In the paragraph 2: Overall National Ranking was mentioned that Serbia is not embraced with these statistics. However it should be stated that the Eco-innovation composite index consists of five components with its indicators, and they are:[26]

[25] European Innovation Scoreboard 2017 Database - Indicator 4.2.1
[26] https://ec.europa.eu/environment/ecoap/indicators/index_en

1. **Eco-innovation inputs:**
    a. Governments environmental and energy R&D appropriations and outlays (% of GDP)
    b. Total R&D personnel and researchers (% of total employment)
    c. Total value of green early stage investments (USD/capita)
2. **Eco-innovation activities:**
    a. Firms declaring to have implemented innovation activities aiming at a reduction of material input per unit output (% of total firms)
    b. Firms declaring to have implemented innovation activities aiming at a reduction of energy input per unit output (% of total firms)
    c. ISO 14001 registered organisations (per mln population)
3. **Eco-innovation outputs:**
    a. Eco-innovation related patents (per mln population)
    b. Eco-innovation related academic publications (per mln population)
    c. Eco-innovation related media coverage (per numbers of electronic media)
4. **Resource efficiency outputs:**
    a. Material productivity (GDP/Domestic Material Consumption)
    b. Water productivity (GDP/Water Footprint)
    c. Energy productivity (GDP/gross inland energy consumption)
    d. GHG emissions intensity (CO2e/GDP)
5. **Socio-economic outcomes:**
    a. Exports of products from eco-industries (% of total exports)
    b. Employment in eco-industries and circular economy (% of total employment across all companies)
    c. Revenue in eco-industries and circular economy (% of total revenue across all companies)

3.3. INNOVATION OUTPUT INDICATOR (IOI)[27]

The Innovation Output Indicator measures the extent to which ideas from innovative sectors are able to reach the market, providing better jobs and making a country more competitive. [28] The index is a composite of four indicators:

- Technological innovation as measured by patents (PCT)
- Employment in knowledge-intensive activities as a percentage of total employment (KIA)
- Average of the share of medium and high-tech goods and services in a country´s export (COMP)
- Employment dynamism of fast-growing enterprises in innovative sectors (DYN)

Serbia is not included in the research,[29] by exception of KIA indicator which is described previously as indicator 4.2.1 included in European Innovation Scoreboard 2017 Database.

[27] Output Indicator 2014 database - Indicator 3.1.1. Source: http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=output
[28] The Innovation Output Indicator 2016 (methodology update) technical report of the Joint Research Centre: http://publications.jrc.ec.europa.eu/repository/bitstream/JRC100825/innovation%20output%20indicator%202016%20report%20pubsy_fin.pdf , Downloaded on November 1st, 2017
[29] The Innovation Output Indicator 2016 (methodology update). Opus Cit.

3.4. RESEARCH AND INNOVATION OBSERVATORY (RIO)

The RIO-PSF website is a reference and key source of information for European and national policy makers as well as other stakeholders in the field of R&I policy. It delivers analysis, insights, statistical data and best practices on designing, implementing and evaluating research and innovation policy at EU and national levels.[30] Some selected indicators are presented below with remark that Serbia is just partly embraced with the statistics.

Indicator: Total Intramural R&D expenditure (GERD) by sectors of performance[31]

The amount of total intramural R&D expenditure (GERD – Gross domestic expenditure on R&D) from all sectors (inclusive of funding from the business enterprise sector, the government sector, the higher education sector and the private non-profit sector) measured as a share of GDP has been on average almost 25% lower in the countries of the Danube region compared to the European Union. However, the countries of the Danube region have steadily decreased the divergence from a maximum of 32% in 2009 to just 18.5% in 2015, as the European Union's share has stagnated at around 2%, while the Danube region increased the share to 1.66% from a modest 1.32% (a more than 26% increase). Relating this indicator Serbia is lagging behind Danube region countries and particularly in comparison to European Union. During the referent period (2009-14) Serbia was closest to the Danube region countries average in 2012 with 0.91%, what was still far behind it (1.56%), particularly in comparison with EU countries (2.01%). There has not been noted any obvious trend relating this indicator even data for 2015 is missing.

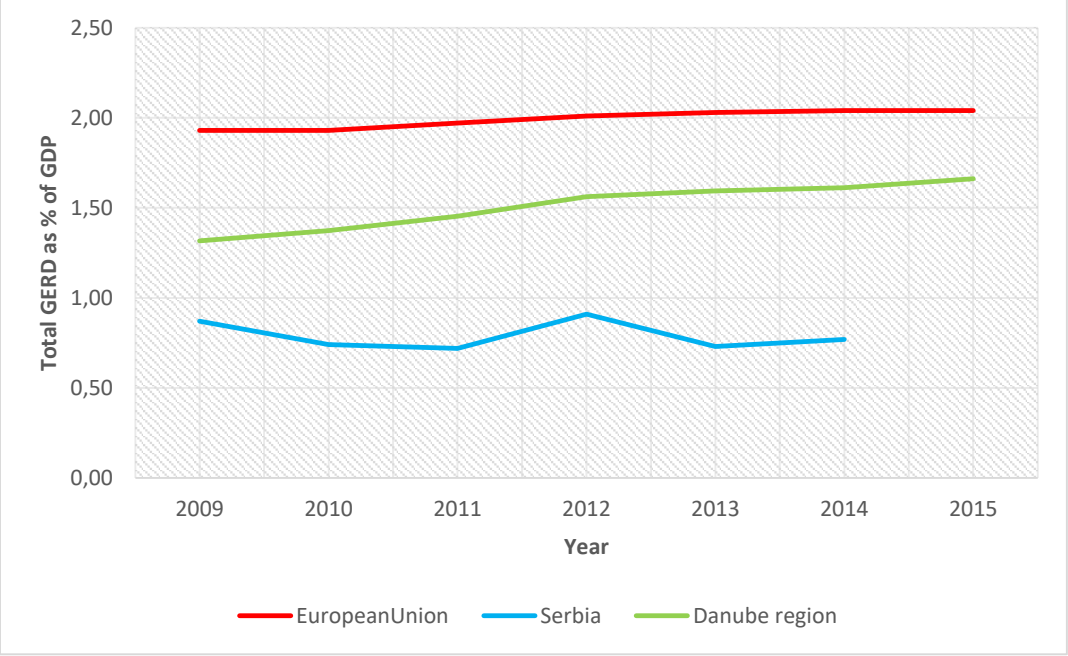

Figure: Total Intramural R&D expenditure as % of GDP (all sectors)

[30] https://rio.jrc.ec.europa.eu/en

[31] Source: http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdec320. Also, Innovation Output Indicator 2014 database - Indicator 1.2.1

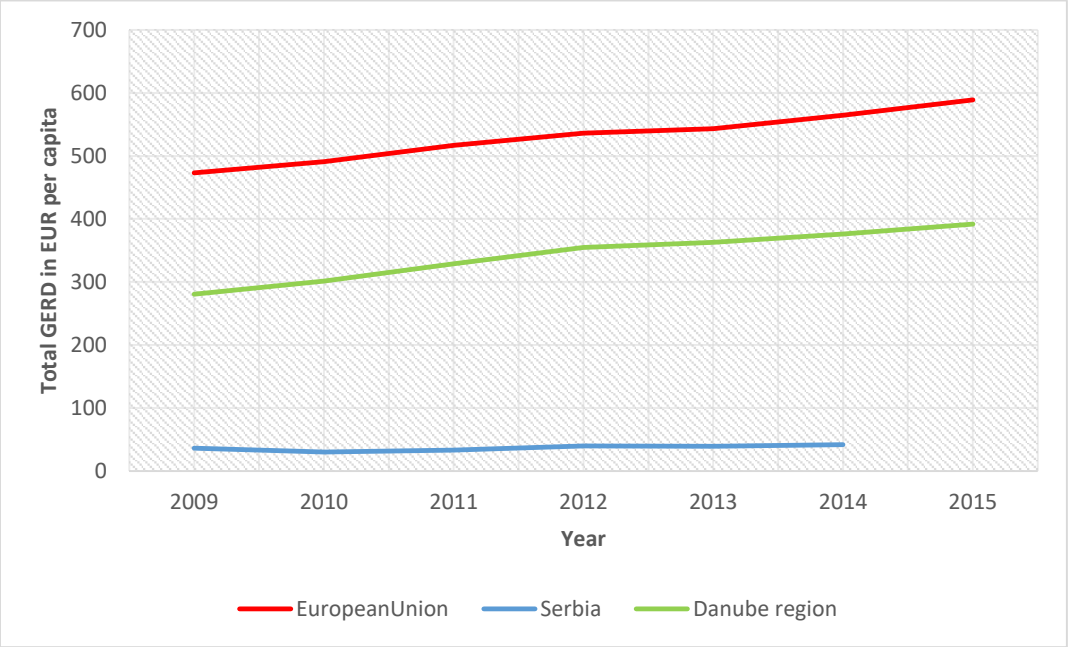

Figure: Total Intramural R&D expenditure in EUR per capita (all sectors)

Within the observed period, the average total intramural R&D expenditure in countries of the European Union was 530 EUR per capita and 342 EUR (-35%) in countries of the Danube region. Expenditure of Serbia was significantly lower and changed within the range of very modest 30 to 42 EUR (in 2014) with no data for 2015. The average expenditure was 32 EUR what is only 9.36% of the average of countries in the Danube region!

OBSTACLE: Total Intramural R&D expenditure is too low relating to both its percentage of GDP and particularly expressed in EUR per capita. Total Intramural R&D expenditure per capita in Serbia was almost 9 times lower in comparison to Danube region countries in 2014 and even 13.4 times lower in comparison to European Union for the same year. There is a clear lack of intramural expenditure for R&D across all sectors, which can be seen as a huge obstacle of further development of Eco-innovations.

Indicator: Business enterprise R&D expenditure (BERD) financed by all sectors in million EUR[32]

This indicator belongs to group of Innovation Output indicators and there is no official data for Serbia in EU statistics. However there are some statistics from other sources.

The total expenditure on R&D in the business enterprise sector (BERD) as a percentage of GDP in Serbia is highly volatile. In 2008, the BERD amounted to only 0.07% of GDP, increasing to 0.13% in 2009 and dropping again to 0.09% in 2010, far behind the EU average of 1.25% for 2010. The percentage of R&D performed by the business sector has increased from 9.08% in 2008 to 11.63% in 2010, yet it continues to be low by EU standards (62%). The share of the BERD in total R&D expenditures (GERD) was only 14.32% in 2009, compared to 62.05% in the EU. According to data for

[32] Innovation Output Indicator 2014 database - Indicator 1.3.1

the 7th Community Innovation Survey from Eurostat, 51.7% of Serbian companies introduced some form of innovation in 2010, close to the EU average (52.9%). Most companies (75.5%) bought machinery or equipment, for 72.5% of innovation expenditures, which points to the adoption of new technologies as the main conduit for innovation.[33] In 2014, the business sector invested in the R&D over 37% of own funds.[34]

OBSTACLE: Total BERD expenditure has been significantly behind EU average. With this insignificant level of BERD Serbia loses opportunity opportunities for product/service development and knowledge sharing.

Indicator: Scientists and engineers as % of active population[35]

This indicator belongs to group of Innovation Output indicators and there is no official data for Serbia in EU statistics.

The number of researchers employed in the R&D increased in 2014 by more than 3%, compared with the previous year. In year 2014 there were engaged 15,163 researches and 1,716 assistant researches who worked in 273 R&D organizations out which 112 are in business sector, 51 in government sector, 104 are in tertiary education and 6 are in non-profit sector.[36]

4. ENERGY

4.1. GENERAL OVERVIEW OF ENERGY SECTOR WITH KEY INDICATORS

Energy sources and potentials for Serbia consist of conventional-fossil fuels (coal, oil and natural gas), then unconventional fuels (oil shale) as well as renewable energy sources (mainly biomass and hydro potential). Coal, oil, natural gas, hydro potential, geothermal energy, biomass, biogas, solar energy and wind energy are included in Serbian energy balance sheet[37] relating production of primary energy which is planned to be produced in amount of 10,599 Mtoe for 2017. Coal is major Serbian primary energy product (70.04%). Far behind are biomass (10.45%), oil (8.52%), hydro potential (7.09%) and natural gas (3.66%). Excluding hydro potential, other renewable energy sources are present at very modest level: while biogass (0.11%), geothermal energy (0.06%), wind energy (0.06%) and finally solar energy with share of 0.01%.

[33] Western Balkans Regional R&D Strategy for Innovation, Country paper series: Serbia. World bank technical assistance project (p123211).October 2013
[34] Statistical Yearbook of Republic of Serbia 2016, Statistical Office of the Republic of Serbia
[35] Output Indicator 2014 database - Indicator 1.1.1. Source: https://rio.jrc.ec.europa.eu/en/country-analysis/Serbia/key-indicators/26163
[36] Statistical Yearbook of Republic of Serbia 2016, Statistical Office of the Republic of Serbia
[37] Energy Balance Sheet for the Republic of Serbia for 2017.

Energy industry of Serbia, in the broadest sense, consists of oil and natural gas industry, coal mines, power system and decentralized systems of district heating companies and industrial energy. The basic characteristic of all energy system parts is a significant obsolescence of technology and low energy efficiency, as well as currently disturbing and in the long term unacceptable technological condition from the standpoint of environmental protection.[38]

For 2017, Serbian energy dependence has been projected to 31.85% which is related to the import of oil (57.56% of total import) and natural gas (32.73% of total import) while the rest of 9.71% goes to coal import. On the other side Serbian energy export relies on electrical power with estimated amount of 1,023 GWh. The Serbian security of supply and energy market integration requires a regional interconnection with other Western Balkan and EU countries, for oil, electricity and gas interconnections, so that the supply of energy from other neighbouring countries can be easier, at competitive prices, and able to counteract emergency situations of energy shortage.[39]

Indicator: Energy dependence[40]

Serbia has substantial domestically available coal (mainly lignite), hydro-energy sources as well as biomass but it is completely dependent on the import of oil and natural gas. The overall energy dependency of the country was 27.2% in 2015 (decreased for 24,2% from 2007), what puts Serbia in more favourable position relating this indicator when it is compared with average in Danube region countries (43,2% in 2015) and particularly in comparison with average of EU-28 countries (54,0% in 2015).

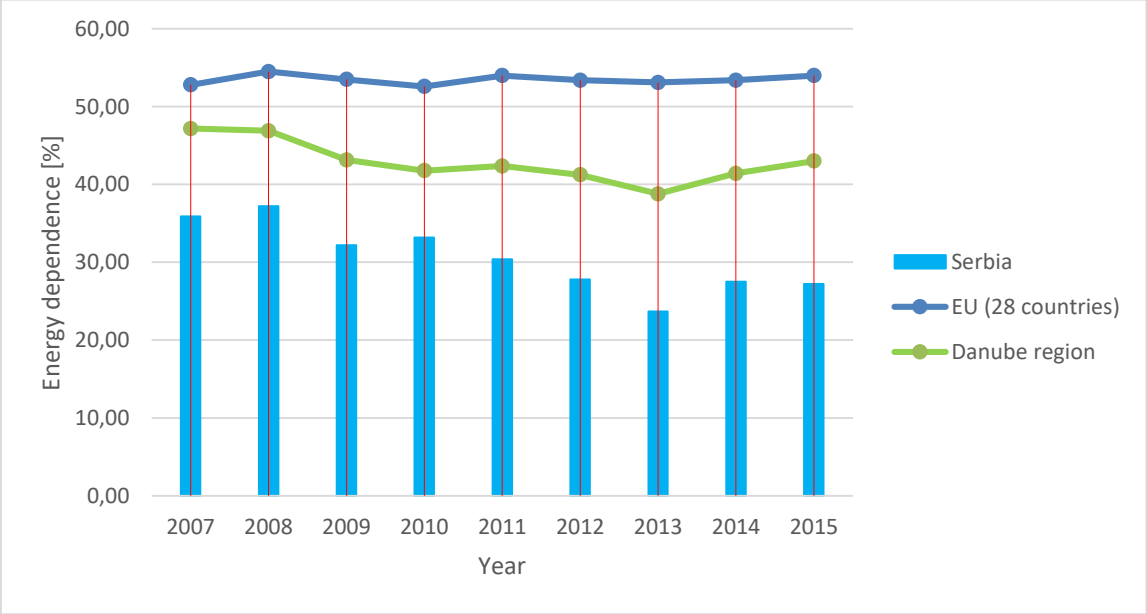

Figure: Energy dependence of Serbia compared to EU-28 and the Danube region

[38] Energy Sector Development Strategy of the Republic of Serbia by 2015.
[39] Support to the Energy sector – Serbia. Annual Action Programme for Serbia (2014) Instrument for Pre-accession Assistance (IPA II) 2014-2020. European Commission.
[40] Energy main indicators Database – Indicator 1.1

OPPORTUNITY: Total coal reserves that can be exploited are significant and represent realistic basis for further long-term development of the energy sector in general and particularly for the electricity generation. On the other side, there are some potential in renewable energy sources in Serbia but they have not been sufficiently explored, particularly relating to solar and wind energy, but still there are rooms to more use hydro potentials (hydro power plants up to 30 MW).[41]

OBSTACLE: High oil and natural gas dependence with obsolete technology for their refining, distribution and final use accompanied with low energy efficiency in energy sector and households as well puts Serbia in energy dependent countries group.

Indicator: Energy intensity of the economy[42]

Serbia had the highest energy intensity in 2015 among all Danube region countries individually as well as in its average. The difference is particularly high in comparison with EU-28 average where it is higher for more than 4 times!

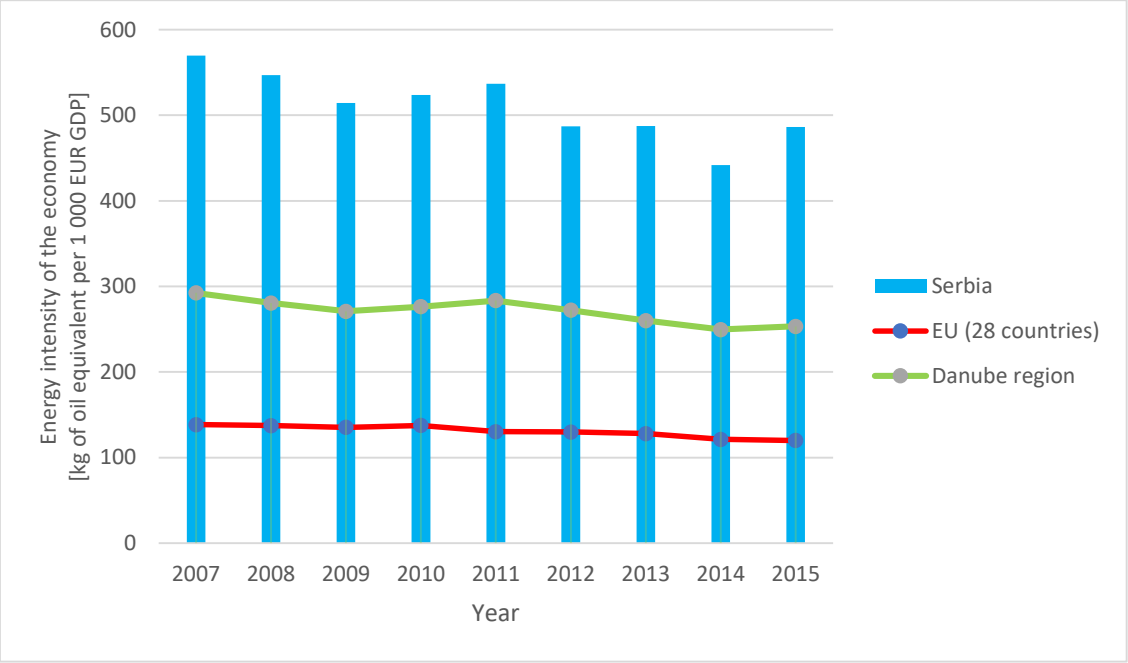

Figure: Energy intensity of the Serbian economy

OBSTACLE: Serbia is highly dependent country in technological way. As a consequence of crises period lasting for almost three decades, technology used in industry is obsolete. On the other side, majority of households still live in old buildings and houses with very low energy efficiency.

[41] Energy Sector Development Strategy of the Republic of Serbia for the period by 2025 with projections by 2030. Belgrade.2016.
[42] Energy main indicators Database – Indicator 1.2

Indicator: Electricity consumption by households[43]

Serbian households consume more electricity than those in EU-28 countries and even more that those in Danube region. At the beginning of the referent period (2007-2015) Serbian households consumed for 13.93% more than EU-28 average and for 25.92% more than at Danube region average. At the end of the referent period figures got more unfavourable for Serbia because its households consumed for 20.86% more than EU-28 average and for 27.16% more than at Danube region average.

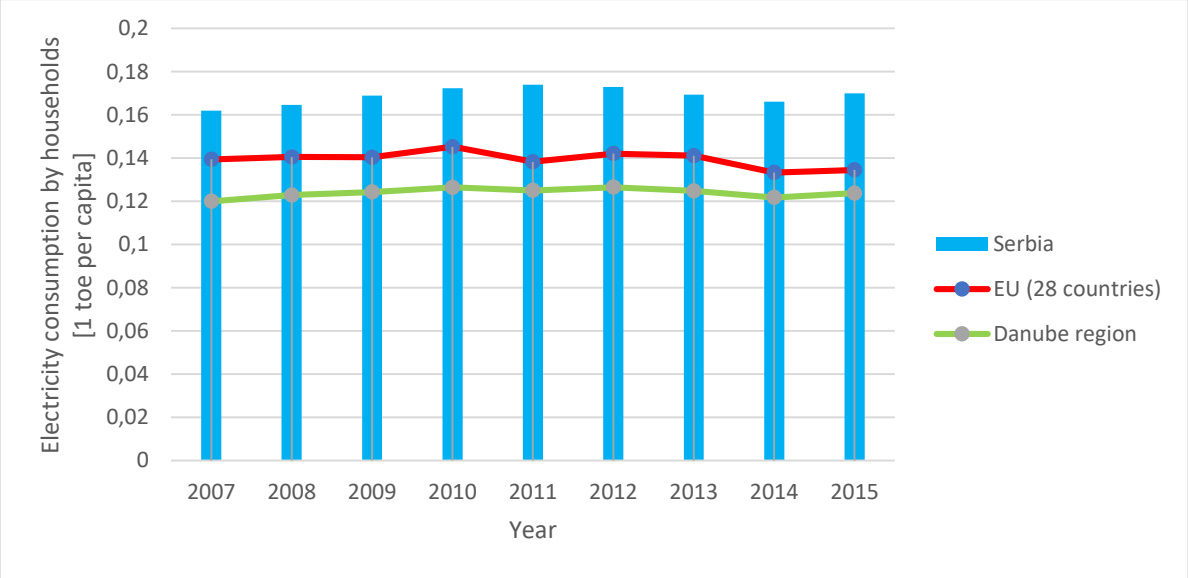

Figure: Electricity consumption by households in Serbia in comparison to EU-28 and Danube region

Relatively high electricity consumption of Serbian households could be explained by huge difference of electricity prices at EU-28 average as well as at Danube region countries average expressed by times rather than percents.

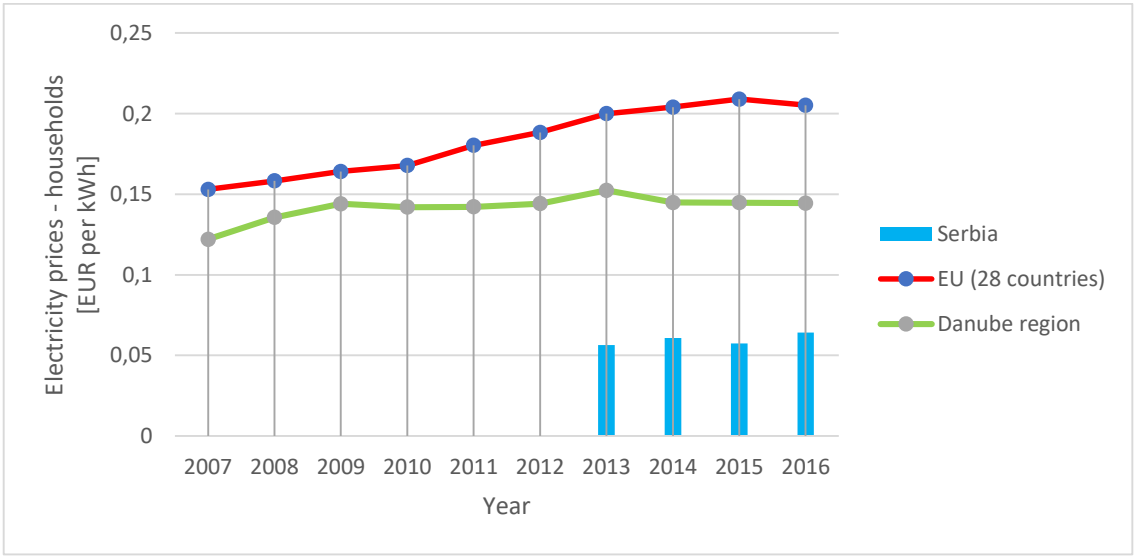

Figure: Electricity prices for households in Serbia in comparison to EU-28 and Danube region[44]

[43] Energy main indicators Database – Indicator 4.2

OBSTACLE: Very low electricity price for households in Serbia has its social dimension but it also has negative influence on relatively high consumption. Depending on energy sources prices, households in Serbia decide which of them should be used for heating, and usually it is electricity.

Indicator: Share of renewable energy in gross final energy consumption[45]

In EU, the use of renewable energy sources is seen as a key element in energy policy, reducing the dependence on fuel imported from non-EU countries, reducing emissions from fossil fuel sources, and decoupling energy costs from oil prices.

According to the figure bellow when comparing Serbia with EU-28 countries over the reference period it is obvious that EU-28 countries share is lagging between 3.89% in 2007 and 8.42% in 2009 to Serbian share. When this share is comparing with Danube region countries situation is changed over the period and at the begging, for two years it was a little bit in favour of Danube region, then for two years in favour of Serbia. Highest difference in favour of Serbia was in 2009 when it was 2.5% and on the other side the highest difference in favour of Danube region countries average it was in 2011 when it was 2.35%.

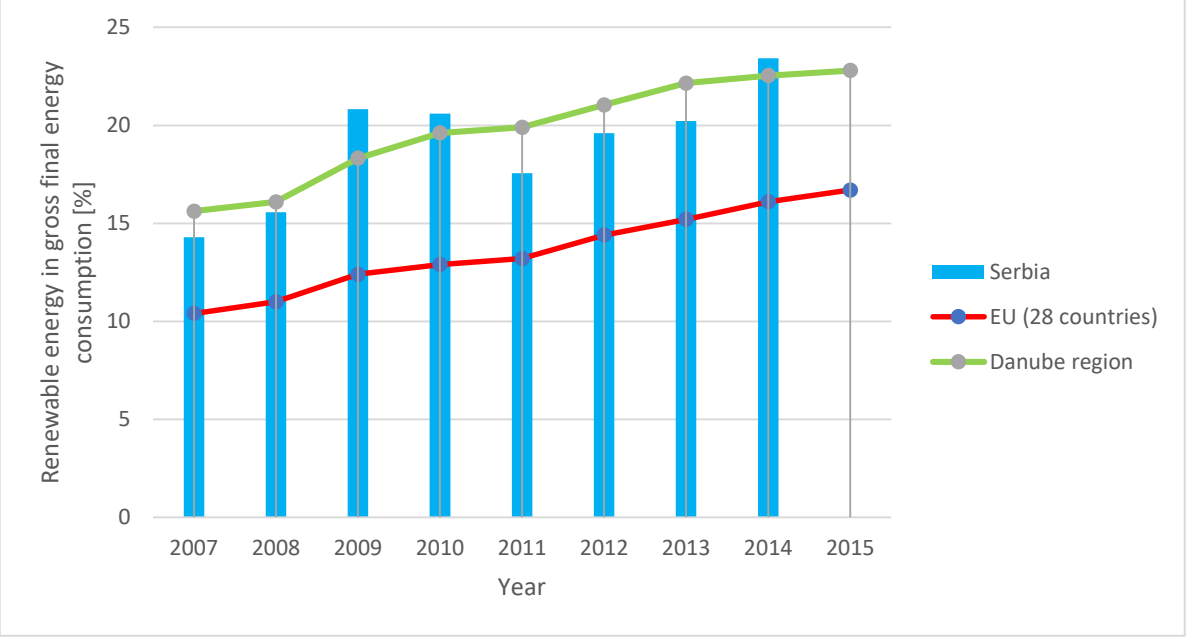

Figure: Renewable energy in gross final energy consumption in Serbia

OPPORTUNITY: Serbia has a significant share of unused potentials in renewable energy sources. Biomass is used only 30.6%, then hydro potential with 54.1%, while geothermal, wind and solar energy usage is at insignificant level. In generaly, there is a high share of 65.2% of unused renewable energy sources.[46]

[44] Energy main indicators Database – Indicator 5.1 (for medium size households)
[45] Energy main indicators Database – Indicator 2.1
[46] Strategy on Energy sector development of the Republic of Serbia with forecasts till 2030

Indicator: Electricity generated from renewable sources

Serbia generates electricity from renewables in share mainly over EU-28 countries average in period 2012-2015. In 2014 this share was in favour of Serbia for 6.7%. With exception of 2014, when Serbia was in front of Danube region countries for 0.9%, it is lagging behind them between 1.81% in 2012 and 5.4% in 2015. According to the energy balance sheet for 2017 estimation for 2016 for this indicator is 27.9% and plan for 2017 is 24.9%

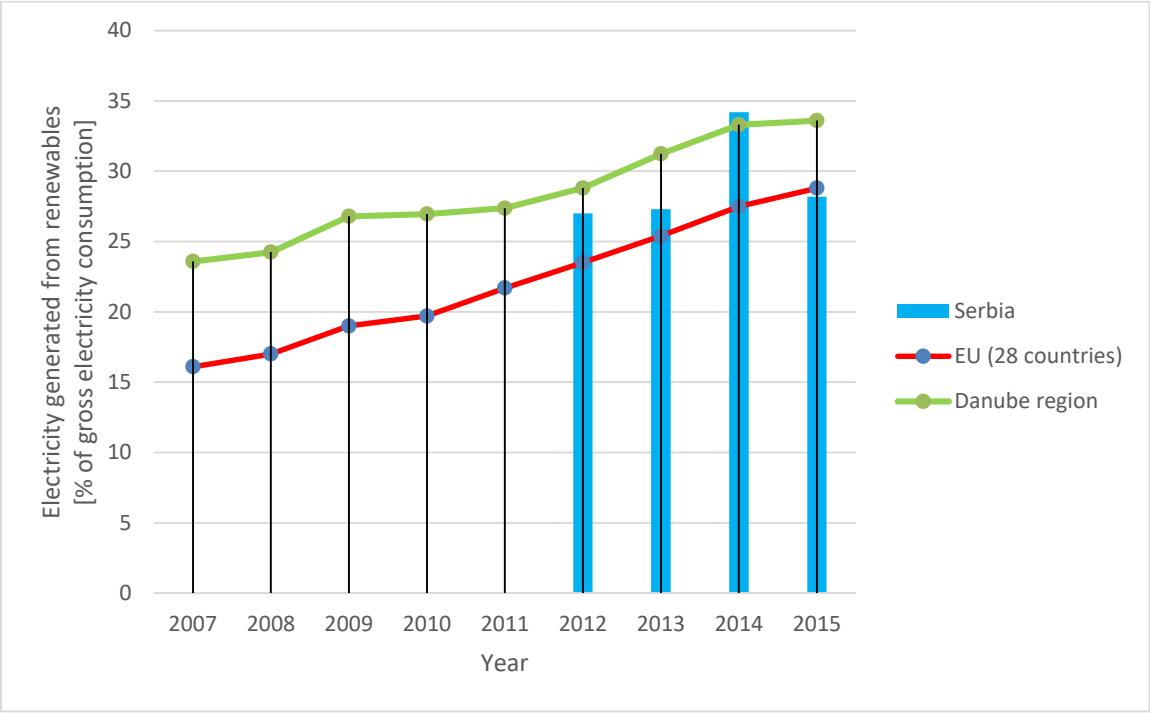

Figure: Electricity generated from renewables in Serbia compared with Danube region and EU-28 countries

OPPORTUNITY: Serbia could increase its electricity generation from renewables mostly using hydro potentials of its small rivers in mountains. They are used only in share of 2.6% for hydro power plants till 10MW and 16.4% for hydro power plants between 10 and 30 MW. [47]

OBSTACLES: Regardless that legislation in energy sector is relatively completed and in power already, there are still some institutional and administrative obstacles that discourage use of renewable sources for electricity generation in full scale. This applies in particular to solar, wind and small hydro power plants electricity generation. All together, they are suitable for private person's investments who could integrate their electricity generation into the National electro-network.

[47] Strategy on Energy sector development of the Republic of Serbia with forecasts till 2030. Opus Cit.

4.2. NATIONAL ENERGY POLICY

National energy policy in Serbia is mainly defined by Energy Law,[48] Law on Efficient Use of Energy[49] and Law on mining and geological explorations[50] as well as with strategic documents like Energy Sector Development Strategy of the Republic of Serbia for the period by 2025 with projections by 2030,[51] National renewable energy action plan[52] and The third Action Plan for Energy Efficiency of the Republic of Serbia for the period until 2018.[53] As strategic documents also could be considered yearly balance sheets prepared to show relevant picture on energy issue that have been realised in previous year, estimation for the current year and plan for the next year. Policy creation and implementation is under jurisdiction of the Ministry of mining and energetics. Beside these regulatory documents, legal framework is consisted by numerous bylaws and regulations.

All of above mentioned documents are in line with those on EU level in order to adjust regulatory frame work in Serbia pre-accession phase. Moreover, Serbia is part of the Regional energy Strategy together with other South-East and Eastern European countries.[54]

Serbia signed European Energy Charter in 2001 as well as International Energy Charter in 2015 and became a part of an international effort to build a legal foundation for energy security, based on the principles of open, competitive markets and sustainable development.

According to the EU Directive on energy efficiency (EED), large and public companies in Serbia are obliged to introduce energy management in their organization in order to prepare action plans for efficient use of energy. Relating to EU Energy Performance of Buildings Directive (EPBD) in Serbia are in force Regulation on energy efficiency in buildings[55] and Regulation on terms, content and manner of certificates issuing on buildings energy characteristics.[56] Last one defines the terms of the energy passport issuing. Progress Report on Implementation of the National Renewable Energy Action Plan of the Republic of Serbia[57] deals with issue of implementation of the EU Renewable Energy Directive (RED). Since the report issuing, more intention has being put to renewable energy sources introduction in Serbian economy and its households as well.

Local energy policy in Serbia is mainly regulated by both Energy Law and Law on Efficient Use of Energy. According to them local self-governments are obliged to develop plans on energy needs as well as to introduce the system of energy management with bunch of obligations in relating area.

[48] Official Gazette of the RS, No. 145/2014
[49] Official Gazette of the RS, No. 25/2013
[50] Official Gazette of the RS, No. 101/2015
[51] Official Gazette of the RS, No. 101/2015
[52] Official Gazette of the RS, No. 53/2013
[53] Official Gazette of the RS, No. 1/2017
[54] Energy Strategy of the Energy Community. More details on: http://www.serviciilocale.md/public/files/ANNEX_1_-_25TH_PHLG_-_REGIONAL_ENERGY_STRATEGY-07_06_12.pdf
[55] Official Gazette of the RS, No. 61/2011
[56] Official Gazette of the RS, No. 61/2011
[57] More details on: http://www.mre.gov.rs/doc/efikasnost-izvori/Progress%20Report%20on%20NREAP%20_SERBIA%202014_ENG_FINAL.pdf?uri=CELEX:32009L0028

In Serbia are available different kinds of incentives to investment in area related to energy. Beside foreign funds (financial organisations, programs e.g.) there are government incentives particularly in area of efficient use of energy and renewable energy sources introduction. Some of incentives are delivered by Budgetary Fund for the improvement of efficient use of energy. On the other side the bylaw on incentive measures for electricity production from renewable energy sources and from highly efficient combined production of electricity and heat foreseen incentives for those who generate energy from renewables.[58]

In order to avoid ad hoc approach to planning preparation and implementation of infrastructure projects, Serbian government prepared the single project pipeline, where sector of energy is dominant, by 40 projects with total approx. value about EUR 4,5 million.

5. ENVIRONMENTAL PROTECTION

5.1 ENVIRONMENTAL CHALLENGES

There are various factors that determine the state of the environment in Serbia. The most important ones are: urban, coal-mining and coal power plants areas where there is heavy traffic and high concentrations of population and industry on the one hand as well as depopulated and rural area where environment is more or less still preserved on the other hand.[59]

Major causes of ambient *air pollution* include: obsolete technologies; lack of flue gas purification devices or poor efficiency of filtration devices; irrational use of raw materials and energy resources; poor maintenance etc. A considerable pollution comes from inappropriate storage and disposal of by-products, such as fly ash from thermal power plants and mine waste rock from open-pit mines. Levels of traffic-generated pollution are raising, including high emissions of benzene, lead and soot, particularly in large cities. In 2014 the greenhouse gas emissions originating from the Serbian energy sector account for about 80% of the total emissions in Serbia what is high not only compared to EU Member States, but also to the world average.[60] Air Quality in urban agglomerations is characterized by polluting substances exceeding daily limit values. An increase in particulate matter (PM_{10}) and Nitrogen dioxide (NO_2) concentrations have been detected in urban areas. Pollen has been also observed and ragweed was again detected as a dominant allergen. Air emissions indicators show a fluctuating trend for SO_2 and NO_x. An increase in NH_3 took place after 2005. The most significant contribution to the total quantity of emissions of these gases provides energy sector (NO_x -57% and SO_2 -82%) and agriculture (92% for NH_3). Emissions of PM_{10} are constant in recent period and the most important sources are the energy sector (55%) and agriculture (29%).[61]

[58] Official Gazette of the RS, No. 56/2016

[59] Source: Report on strategic environmental assessment for the energy sector development strategy of the Republic of Serbia by 2025 with projections until 2030, for the period 2017–2023. Available at: http://www.mre.gov.rs/doc/javne%20rasprave/17.07.17/09.%20SPU_POS_FIN_english_JULY%202017.pdf

[60] Source: Opus Cit.

[61] European Environment Agency:

Major sources of *surface water pollution* in Serbia include untreated industrial and municipal wastewater; agricultural drainage water drainage and seepage water from landfills, as well as water pollution caused by pollutants that are spread through rivers, floods and waste materials originating from thermal power plants. Additionally, the existing industrial capacities within settlements are most frequently connected to the public sewers of settlements. In industry it is evident that most frequently there are no built plants for pre-treatment of industrial wastewaters before their discharge into the town sewers, i.e. into recipients, or that their functioning is inefficient, which may affect the functioning of the existing plants for wastewater treatment from settlements, as well as the living organisms in water and on the banks.[62] Surface and ground water quality monitoring shows that in most cases concentrations of BOD, ammonium ion, nitrates and orthophosphates remain within range defined as excellent or good ecological status (I and II class of water quality). The worst quality has been detected in surface waters (rivers and channels) in the province of Vojvodina because concentration of polluting substances of almost half of the samples are not within ranges prescribed for particular water bodies. Regarding water emissions, the law states that sewage systems should be managed by public enterprises. Data indicates average connection rates to the sewage systems for 60% of inhabitants. 54.76% of industrial facilities discharge their wastewater into the river and 19.04% into city sewer systems.[63]

The *soil quality*, i.e. degree of soil degradation, in Serbia is affected by numerous natural processes (erosion, landslides, surface runoff). However, anthropogenic phenomena and processes have significant effect on the soil quality, amongst which the most significant include: soil pollution caused by chemical substances (mineral fertilizers, pesticides) and organic fertilizers (solid and liquid manure) used for agricultural purposes; industrial processes; mining works; inappropriate waste disposal, existence of septic tanks that receive non-sanitary wastes (form households, livestock farms); pollution of soil along the roads due to unsolved water drainage; changes in land use (illegal construction); etc. Soil pollution is also affected by inappropriate agricultural practices, including uncontrolled and improper use of artificial fertilizers and pesticides, as well as absence of irrigation water quality control. Sporadic presence of heavy metals in soil is a result of untreated drainage waters from landfills, as well as from mining facilities and power plants. oil is polluted in areas of intensive industrial activities, inappropriate waste disposal sites, mining areas, as well in places where different accidents occur. An important source of soil pollution causing high degree of soil degradation include exploitation of mineral raw materials, particularly in mining basins, as well as the uncontrolled and inappropriate disposal of industrial waste, particularly nearby large industrial centers. Another source of soil pollution is deposition of air pollutants contained in the exhaust gases from vehicles along roads, in particular along main roads.[64] The main soil pollutants are Zinc (Zn), Copper (Cu), Nickel (Ni), Chromium (Ch) and Cobalt (Co). At the national level, there are about 384 localities comprising potentially contaminated (90%), contaminated (8%) and re-mediated sites (2%). Results of the analysis of local soil pollution sources showed that the majority of sources come from public municipal waste dumps (43.5%) followed by locations used for exploitation and oil production (22.5%). Other important soil pollution sources are industrial waste dumps and industrial facilities. At

https://www.eea.europa.eu/downloads/b040686631354c7eb3af56c9fecdb2ad/1507632400/serbia.pdf

[62] Source: Report on strategic environmental assessment... Opus Cit.

[63] European Environment Agency. Opus Cit.

[64] Source: Report on strategic environmental assessment… Opus Cit.

the same time, examination of soil samples in proximity to 28 industrial facilities showed increased values of several elements.[65]

5.2 ENVIRONMENTAL LEGISLATION

Environmental issues in Serbia are under the jurisdiction of the Ministry of Environmental Protection.[66] As an implementing body, the Agency for Environmental Protection has been established which deals with all relevant issues such as: monitoring of the state of environmental factors through environmental indicators, the registry of pollutants, management of relevant national laboratory etc. Pursuant with its jurisdiction, the Ministry creates legal framework in relevant area.

In narrow sense the environmental legislation is defined by: Law on Environmental Protection,[67] Law on Nature protection,[68] Law on Waste Management,[69] Law on Packaging and Packaging Waste,[70] Law on Strategic Environmental Impact Assessment,[71] Law on Environmental Impact Assessment,[72] Law on Integrated Prevention and Control of the Environmental Pollution,[73] Law on Air protection,[74] Law on Environmental Noise Protection,[75] Law on Chemicals,[76] Law on Biocidal Products,[77] Law on Soil Protection,[78] Law on Waters,[79] Law on protection and Sustainable use of Fish Resources,[80] Law on Non-Ionizing Radiation Protection,[81] Law on Ionizing Radiation Protection and Nuclear Safety.[82]

In addition, the legal basis is made by laws and regulations and accepted international treaties and agreements.

Beside above mentioned laws, in regulatory framework are included strategic documents such as: National Strategy for Sustainable Use of Natural Resources and Goods, National Program for Environmental Protection, Water Management Strategy in the territory of the Republic of Serbia, Strategy for Cleaner Production and Waste Management Strategy.

The system of environmental financing in Serbia is decentralized and relies on funds from the budget and special funds of its own revenue. Other sources of funding include municipal budgets, the

[65] European Environment Agency. Opus Cit.
[66] For more detail see: http://www.ekologija.gov.rs/
[67] Official Gazette of the RS, No. 14/2016
[68] Official Gazette of the RS, No. 14/2016
[69] Official Gazette of the RS, No. 14/2016
[70] Official Gazette of the RS, No. 36/2009
[71] Official Gazette of the RS, No. 88/2010
[72] Official Gazette of the RS, No. 36/2009
[73] Official Gazette of the RS, No. 25/2015
[74] Official Gazette of the RS, No. 10/2013
[75] Official Gazette of the RS, No. 88/2010
[76] Official Gazette of the RS, No. 25/2015
[77] Official Gazette of the RS, No. 25/2015,
[78] Official Gazette of the RS, No. 112/2015
[79] Official Gazette of the RS, No. 93/2012
[80] Official Gazette of the RS, No. 128/2014
[81] Official Gazette of the RS, No. 36/2009
[82] Official Gazette of the RS, No. 93/2012

financial assets of the economy, financial assets of public utility companies (PUC) and foreign financial assistance.[83] The latest foreign assistance is related to innovative ways to reduce greenhouse gas (GHG) emissions and start the fight against climate change.[84] Relating to the government ***incentives*** in environmental area there are two main incentives regulated by different rules: The Rule on Adjusted Amount of Incentives for Re-use, Recycling and the Use of Certain Types of Waste[85] and The Rule on Adjusted Amount of Incentives for the Management of Special Waste Flows.[86]

There are also rules which indirectly regulate incentives in order to protect environment, and they are: Regulation on Incentives for Electricity Generation from Renewable Sources and from Highly Combined Production of Electricity and Heat[87] and Regulation on implementation of the Program Financing Activities and Measures of Improving the Efficient Use of Energy in 2016.[88]

5.3 ENVIRONMENTAL TAXES

According to the Law on Environmental Protection there are two economy instruments related to environment protection and they are: Compensation for using natural resources and Compensation for environment pollution. One of the main principles in the Law is the principle that "the polluter pays". Based on this principle several regulations are adopted that foreseen criteria and amount which should be paid in particular cases. On the national level the main regulatives in this area are: Regulation of types of pollution, the criteria for calculation of compensation for environment pollution and tax payers, the amount and method of calculation and payment of fees,[89] Rules on adjusted amount of compensation for environment pollution, [90] Regulation on the criteria for the calculation of fees for packaging or packaged product and exemption from payment of fees, payers, the amount of compensation and the manner of calculation and payment of fees, [91] Regulation on products that after use become special waste flows, form on daily records of quantities and types of produced and imported products and annual report, manner and deadlines for submission of the annual reports, compensation payers, criteria for calculation, amount and method of compensation payment, [92] Regulation on the fee amount, fee payers, as well as the method of fees payment for assessment and verification of data on biocidal products.[93]

Beside previously mentioned regulates, according to the Law there is a possibility to introduce environmental compensations on local level as well. Many of local-self-governments in Serbia already adopted local decisions on compensation for environment protection and advancement.

[83] Environmental Protection Agency: http://www.sepa.gov.rs/index.php?menu=211&id=20008&akcija=showAll
[84] More detail at: https://balkangreenenergynews.com/public-call-innovative-solutions-ideas-fight-climate-change/
[85] Official Gazette of the RS, No. 44/2016
[86] Official Gazette of the RS, No. 44/2016
[87] Official Gazette of the RS, No. 56/2016 and 60/2017
[88] Official Gazette of the RS, No. 56/2016 and 13/2016
[89] Official Gazette of the RS, No. 91/2012
[90] Official Gazette of the RS, No. 37/2014
[91] Official Gazette of the RS, No. 8/2010
[92] Official Gazette of the RS, No. 3/2014
[93] Official Gazette of the RS, No. 90/2015

5.4 KEY INDICATORS

Indicator: Environmental protection expenditure (as a % of GDP)[94]

Serbia is far behind Danube region countries and particularly in comparison to EU-28 in spending for environmental protection purposes such as all purposeful activities directly aimed at the prevention, reduction and elimination of pollution or any other degradation of the environment. During the referent period 2007-2013, Serbia didn't get over 0.1% of its GDP, while Danube region countries spent between 0.39-0.51% and at EU-28 level it was in range 0.67-0.75% of GDP.

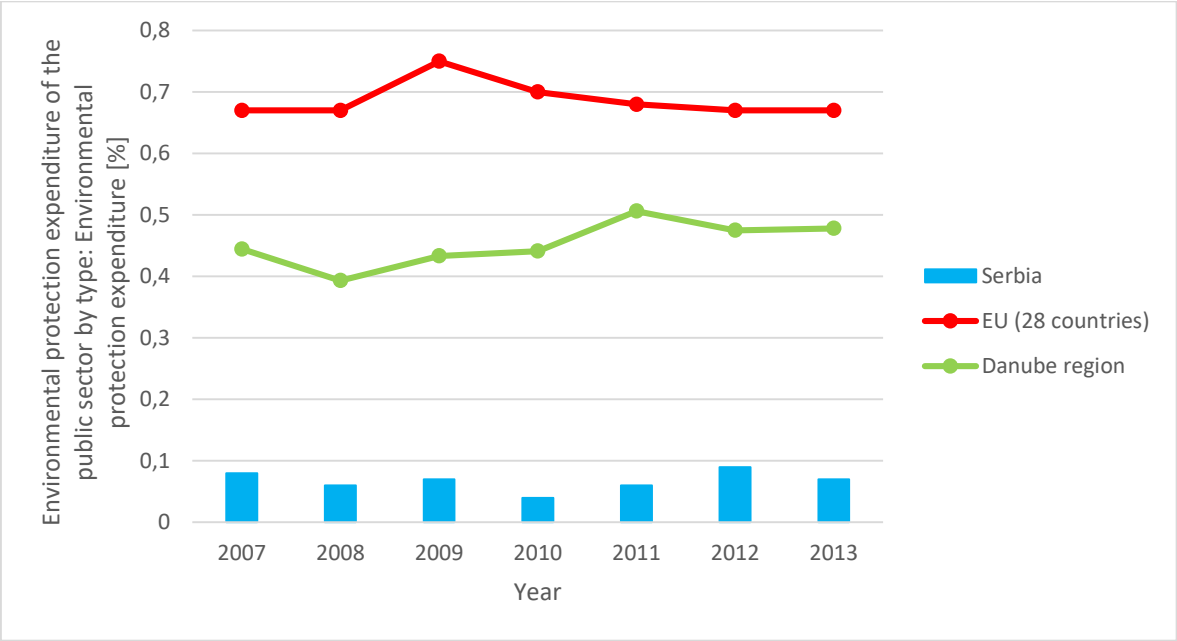

Figure: Environmental protection expenditure in Serbia compared to EU-28 and Danube region countries

OBSTACLE: The existing budget revenues at all levels of governance are insufficient to respond to the needs, problems and requirements of the environmental protection. The existence of the possibility to use even inadequate revenues, as non-dedicated ones, makes the environmental finance system insufficiently effective in terms of preserving and improving the conditions in the environment. This way, it diminishes Serbia's ability to provide the financial resources necessary for the successful compliance with the EU standards.[95]

Indicator: Environmental tax revenues (as a % of GDP)[96]

In field of environmental tax revenues Serbia refers higher values in comparison to Danube region and particularly in comparison to EU-28 countries! During the referent period 2007-2015, Serbia

[94] Environment main indicators – Indicator 1.1
[95] Sipka, S. & Maksimovic, D. (2017). Fin*ancing of the Environmental Protection at the Local Level: Relationship between Revenues and Expenditures*. Policy Brief. European Policy Centre.
[96] Environment main indicators – Indicator 2.1

permanently recorded higher values reaching maximum in 2015 with 4.21%, while Danube region countries recorded 2.84% and EU-28 average was 2.44% what was 72.54% lower value comparing to Serbian value.

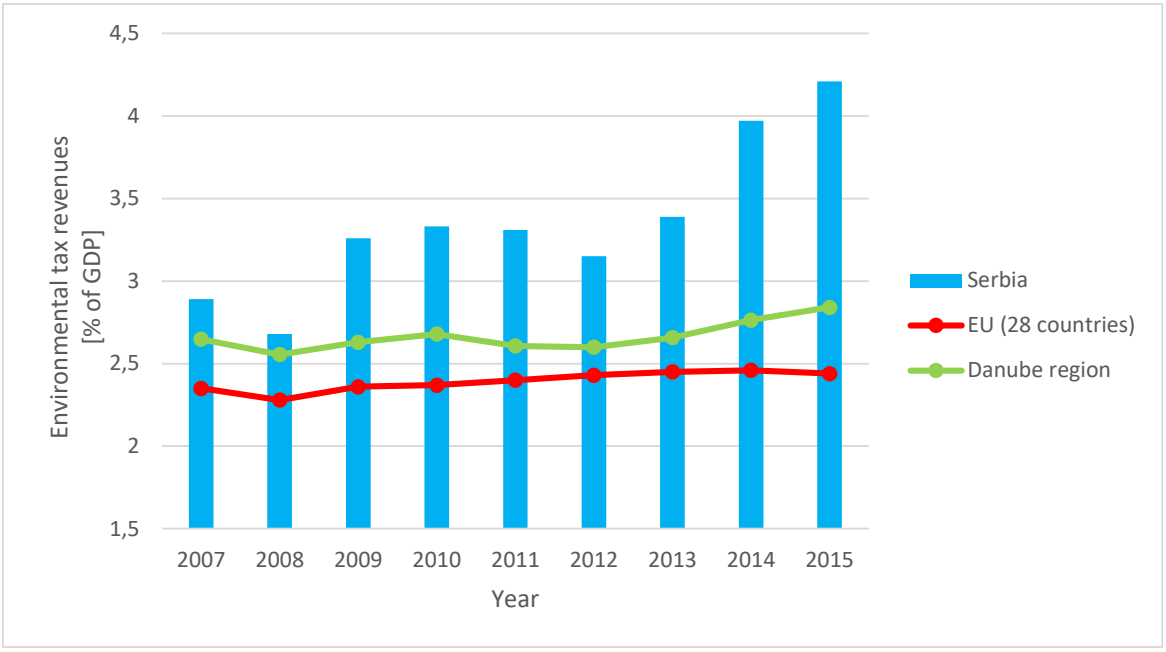

Figure: Environmental tax revenues in Serbia compared to EU-28 and Danube region countries

OPPORTUNITY: Significantly high level of revenues from environmental tax suggests that there room for investments in environment protection area in Serbia. There is a need for projects in this area which could improve state of environment in country.

OBSTACLE: High level of revenues from environmental tax (in % of GDP) could lead to avoiding to pay these taxes particularly when it is significantly higher than in more developed countries and particularly because of previous indicator that suggests that money collected here is not spent purposeful in order to improve environment but for other purposes.

Indicator: Energy taxes (EUR million)[97]

When energy taxes are expressed in EUR then EU-28 average is incomparable with Serbia. In 2014 at EU-28 average it was EUR 263,106 million while in Serbia as its maximum in referent period 2007-2014 it was EUR 1,095 million. For clearer picture of this indicator it is purposeful to compare Serbia with moderate innovator countries which average is still over Serbia but not so significantly like EU-28 and even Danube region countries. Moderate innovator countries collected in average between EUR 1,561.42 million (in 2009) and EUR 1,712.89 million (in 2007) while Serbia refers between EUR 725.96 million (in 2008) and EUR 1,095 million (in 2014). Danube region countries average in far over these values in referent period and since 2008 it is between EUR 6,277.577 million (in 2008) and EUR 6,742.433 million (in 2014).

[97] Environment main indicators – Indicator 2.2

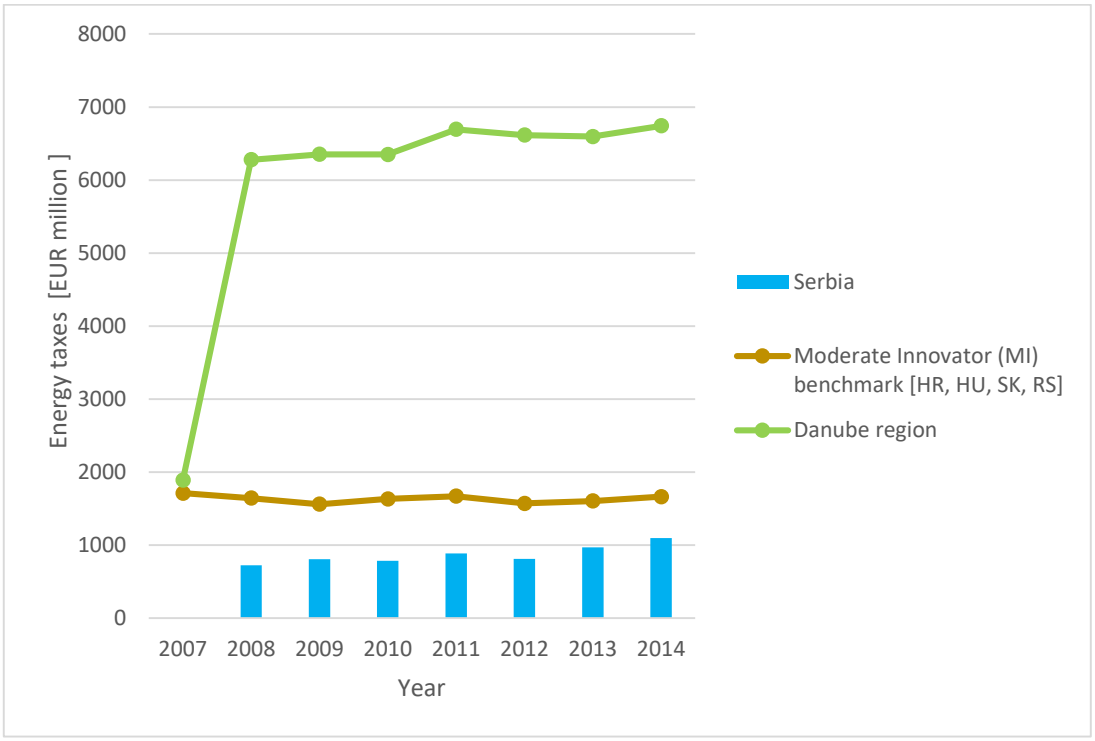

Figure: Energy taxes collected in Serbia compared to MI and Danube region countries

OBSTACLE: Serbian GDP expressed in EUR is far below in comparison to EU-28 and Danube region average. Modest amount collected in EUR on behalf of energy taxes is big obstacle for more significant investments, so the priorities should be defined and direct money toward them.

Indicator: Implicit tax rate on energy (EUR/toe)[98]

This indicator is defined as the ratio between energy tax revenues and final energy consumption calculated for a calendar year. During the referent period Serbia recorded an increase from modest 66.32 in 2007 till 133 EUR/toe in 2015 what is more than a doubled value. But, this is still below in comparison to Danube region countries particularly in 2007 when it was 130.8 and in 2015, 155.4 EUR/toe. EU-28 countries recorder significantly higher values than Serbia, so in 2007 it was 192.78 and in 2015 increased to 233.65 EUR/toe what is 75.68% higher value compared to Serbia in same year.

[98] Environment main indicators – Indicator 2.3

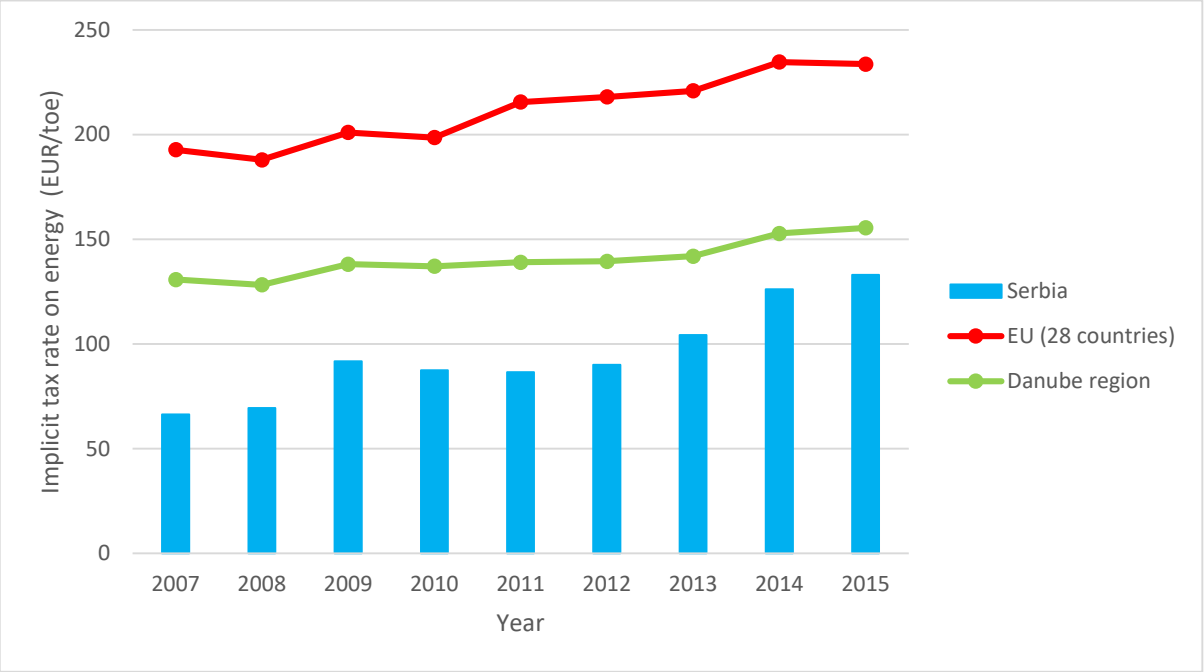

Figure: Implicit tax rate on energy in Serbia compared to EU-28 and Danube region countries

OBSTACLE: The energy tax has a biggest share in environment taxes in Serbia, like it is in EU countries. Relatively low level of energy taxes in comparison to EU is at least a consequence of modest GDP as well as low households incomes in Serbia. This way government keeps social tensions under control on one side, but on the other side that leads to maintain low level of awareness of energy efficient use.

Indicator: Resource productivity (EUR/kg, chain linked volumes (2010))[99]

Resource productivity is gross domestic product (GDP) divided by domestic material consumption (DMC). DMC measures the total amount of materials directly used by an economy. It is defined as the annual quantity of raw materials extracted from the domestic territory of the focal economy, plus all physical imports minus all physical exports.

When it comes to resource productivity Serbia shows very low rate. Its indicator vary between 0.2669 EUR/kg in 2008 and 0.296 EUR/kg in 2012 while Danube region countries recorded minimum 0.83499 EUR/kg at the beginning of the referent period and 1.14463 EUR/kg at its end in 2016. EU-28 countries are more productive than previous group and this indicator behaves at the same manner. The minimum of 1.5664 EUR/kg is recorded at the beginning of the referent period in 2007 while maximum is reached at its end in 2016 at level of 2.0728 EUR/kg. These figures in full scale shows that Serbian economy in total is highly inefficient relating resources productivity.

[99] Environment main indicators – Indicator 3.1

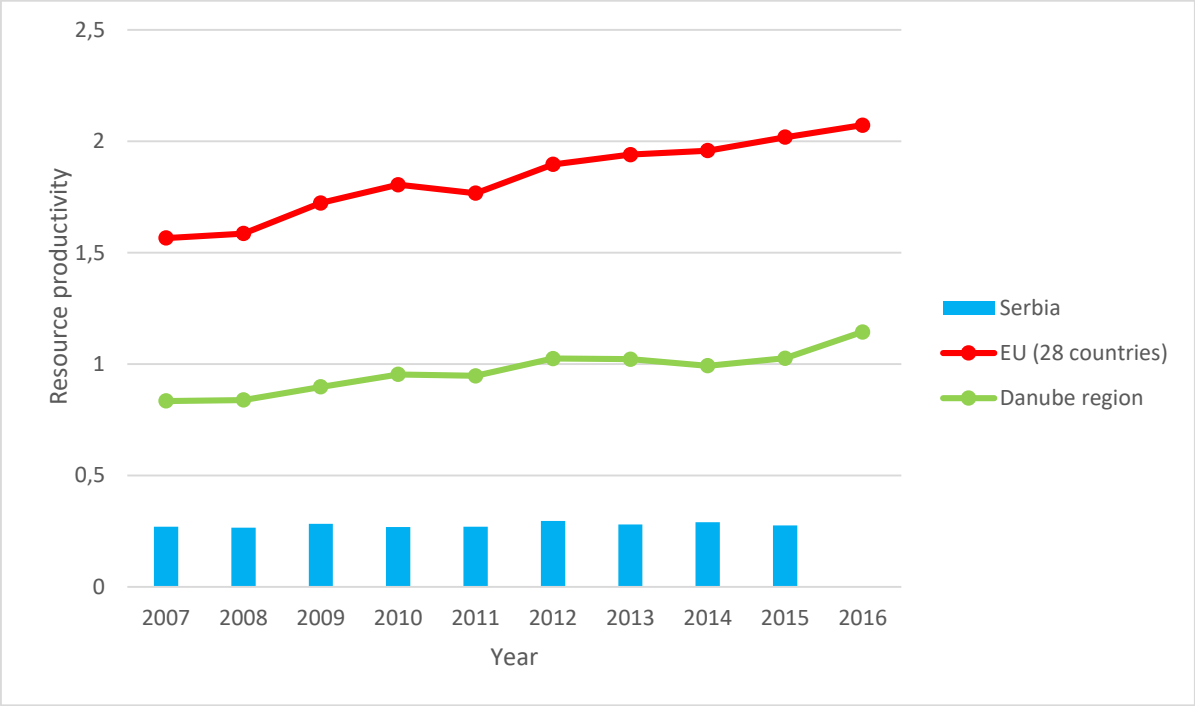

Figure: Resources productivity in Serbia compared to EU-28 and Danube region countries

OBSTACLE: Low level of resources productivity in Serbia is related to state of art of its industry and infrastructure in general. By using obsolete technology in industry Serbia couldn't be competitive on foreign markets. This way, investments in new technologies which could increase the resources productivity become unrealistic and country enter the magic circle with no way out.

Indicator: Domestic material consumption (tonnes per capita)[100]

Domestic material consumption (DMC) measures the total amount of material directly used by an economy. This indicator measures the total amount of materials directly used by an economy and is defined as the annual quantity of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports. DMC in tonnes per capita provides an indication of the comparable material consumption of nations normalised with the population.
When comparing Serbia with EU-28 and Danube region relating DMC indicator situation has varied during the referent period. At the beginning, for 3 years frim 2007 till 2009 Serbia has lagged behind EU-28 and even more behind Danube region average. In 2010 Serbia with 15.19 t/capita overcame EU-28 that recorded 14.09 t/capita, but it was still behind Danube region with 15.41 t/capita. Serbia kept this advantage in comparison to EU-28 at the end of referent period with maximum difference of 17.66%in 2015. In comparison with Danube region Serbia recorded better value of this index only in 2013 with 15.27 t/capita comparing to 15.09 t/capita

[100] Environment main indicators – Indicator 3.2

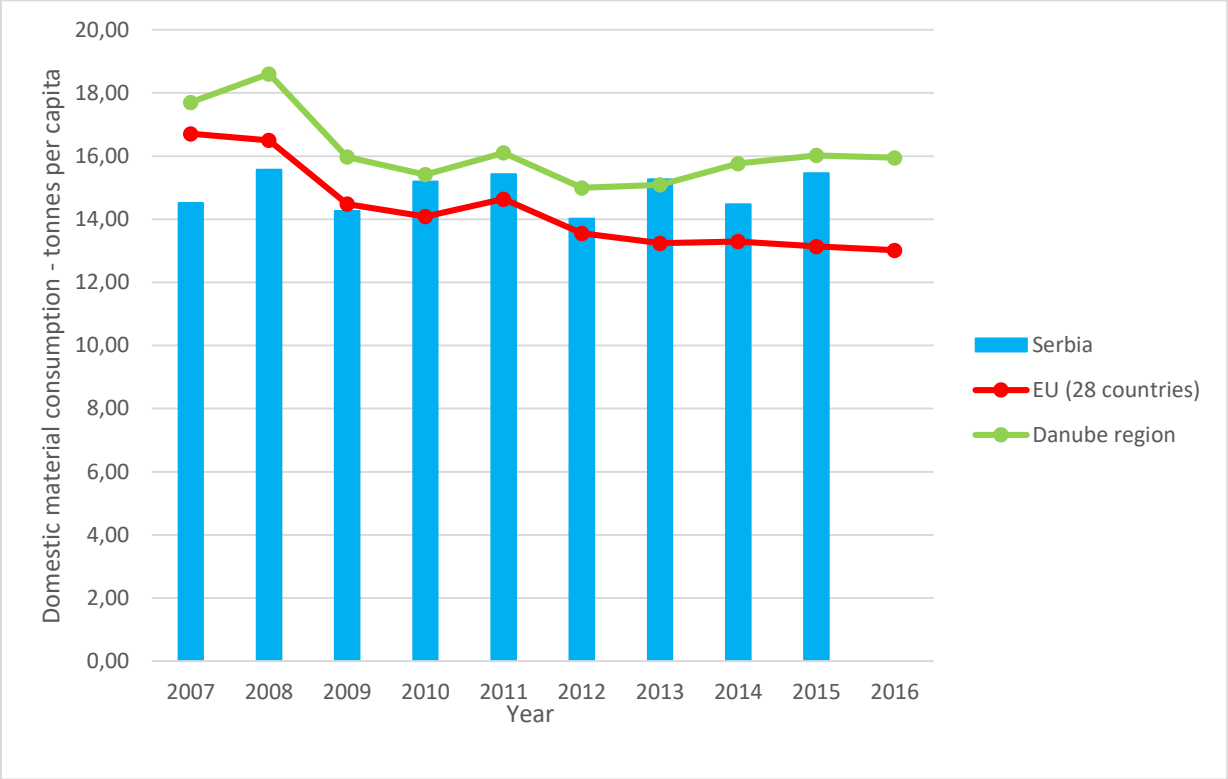

Figure: Domestic material consumption in Serbia compared to EU-28 and Danube region countries

OBSTACLE: While in developed countries DMC decreasing, Serbia keep and even grow this indicator. Industry, as a main 'consumer' use more materials than on EU-28 level what implies that Serbian industry is strongly dependent on physical inputs rather than knowledge. This way, Serbia will remain low competitive economy based on use of physical inputs.

Indicator: Recycling rate of municipal waste (%)[101]

The recycling rate, expressed in percentage, is the tonnage recycled from municipal waste divided by the total municipal waste arising. Relating to this indicator Serbia has records only for period 2013-2015 and they are insignificant in comparison to Danube region and particularly to EU-28 average. While Serbian % of recycled municipal waste is 1 or below it at Danube region countries it is between 20.34% in 2008 and 26.57% in 2015. EU-28 average is much higher in comparison to Danube region average and it permanently grows through the referent period, from 35% in 2007 up to 45% in 2015.

[101] Environment main indicators – Indicator 4.2

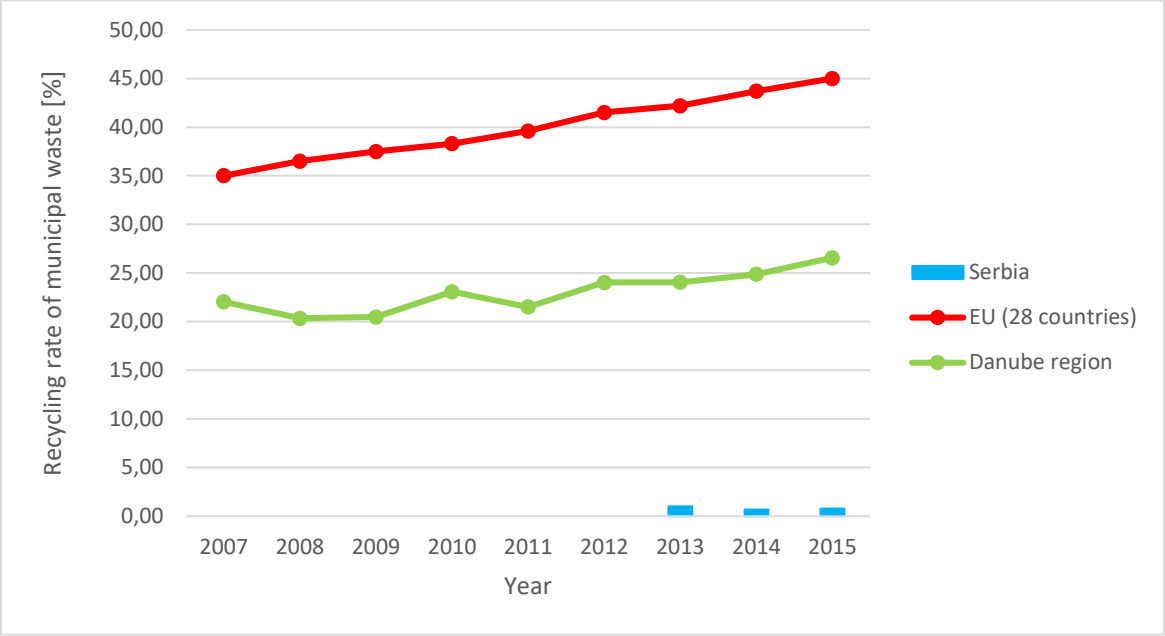

Figure: Recycling rate of municipal waste in Serbia compared to EU-28 and Danube region countries

OBSTACLE: Very low recycling rate of municipal waste indicates that environment protection awareness is also at very low level. Recycling is not just a technical issue it is way of living and demonstration of environmentally friendly behaviour in all levels of the society. On the other hand, Serbia loses significant amount of finances that has to spent on purchasing new materials instead of recycle used ones. At the same time, illegal dumps 'grows' country wide endangering environment.

6. ECONOMY AND DEMOGRAPHY

6.1. OVERVIEW

In 2016 Serbia stepped up the implementation of structural reforms, broadening the focus to include social sector transformation. Although, there were a few elections and even more government changes, Serbia maintained the emphasis on reforming the state administration, public finances, and the economy, along with pursuing the EU accession process. The Government's economic reform program focuses on ensuring economic and financial stability, halting further debt accumulation, and creating an environment for economic recovery and growth to foster employment and raise living standards. These goals will be achieved primarily through fiscal consolidation measures and an acceleration of structural reforms to remove existing bottlenecks to economic growth, including reform of state-owned enterprises, creating the foundation for faster growth and private sector–led job creation over the medium term.[102]

[102] http://www.worldbank.org/en/country/serbia/overview

Serbia recorded almost seven years of weak or negative growth and in 2016 growth returned to its pre-crisis level. There are expectations that in 2017 foreign investments in industry and infrastructure will strengthen this recovery, as well as resurging public investment. Household consumption is expected to revive as employment picks up, despite still high unemployment and a significant informal jobs market (almost 23% of total employment). Domestic demand benefits from a return to growth in bank lending thanks to lower interest rates. Credits, however, are limited by still high levels of non-performing loans, especially with public-sector banks. External trade is still expected to make a positive contribution thanks to good manufacturing export performance, especially of cars. The deficit is expected to narrow further in 2017. Income will benefit from growth, while the decline in current spending is likely to continue as civil service jobs are cut and with the implementation of pension reform. The reduction in the number of public-sector companies, often poorly managed and, therefore, costly, will also play a key role. However, the restructuring is a long way from being vested or completed. Wage moderation could come to an end and pension reform may not be fully implemented. The functioning of the administration still leaves plenty to be desired. The financing of local authorities, in deficit, needs to be reformed. The restructuring of many state-owned enterprises in transport, energy, the mining industry and manufacturing, sometimes prerequisite to privatisation, or the winding up of those in the biggest trouble, is delayed. This is critical to initiating the alleviation of the heavy burden of public debt, which could rapidly become untenable if growth declines. Trade in goods is broadly running a deficit in excess of 10% of GDP in 2016. Exports are dominated by automotives, agricultural products, metals and a large variety of medium to low value-added manufacturing products, mostly destined for the neighbouring Balkan countries. A large part of the deficit is explained by imports associated with foreign investments. The services surplus (almost 3% of GDP) and, to a greater extent, the remittances by emigrant workers (9%) offset a good part of the trade deficit. The remaining current account deficit is largely financed by foreign direct investments, both in industry (e.g. Fiat in automotive) and in transport and energy infrastructure (China, Russia). External debt is in excess of 80% of GDP, of which 60% is held by the pubic sector, but it is medium term, cheap and partially linked to FDIs.[103]

Less than a half of Serbia population is economically active (41.3%), whereby the share of male labour force (57.2%) prevails over that of female labour force (42.8%). The share of persons who perform an occupation in the total population aged 15 and over , i.e. the employment rate is 37.4%, being higher in men (44.9%) than in women 30.5%). In Serbia, the unemployment rate, i.e. the share of unemployed persons in the total economically active population is 22.4%. The rate of not economically active, representing the share of the not economically active population (aged 15 and over) in the total population aged 15 and over, is 51.8%. The most economically active persons in Serbia are those who perform some of the occupations from the groups “Technicians and associate professionals” (16.2%), “Service and sales workers” (16.1 %) and “Professionals and artists” (14.8%). The least is the share of persons who perform any occupation from groups “Armed forces occupations” (0.9%), “Managers” (2.5%) and “Clerical support workers” (7.3%). These occupations are mostly performed in the following activity sections: “Manufacturing” (17.2%), “Agriculture, forestry and fishing (14.8%), “Wholesale and retail trade; repair of motor vehicles and motorcycles” (14.7%). Observed by region, most employees in the manufacturing industry has been recorded in

[103] http://www.coface.com/Economic-Studies-and-Country-Risks/Serbia

Region Vojvodina (31.9%) and Region Šumadija i Zapadna Srbija (31.9%). Almost half (46.4%) of all employees in the section "Agriculture, forestry and fishing" has been recorded in the Region Šumadija i Zapadna Srbija, while most employees in the section "Wholesale and retail trade" were in the Beogradski region (32.2%).[104]

On the other side, Serbia is burden by both declining and aging population. There are significant areas which are abandoned or at least left by youngsters. In the period from 2005 to 2015, the number of population decreased by 345,386 and the average annual growth rate was –4.75 per 1.000 inhabitants, which is primarily the result of a negative natural increase and emigration of citizens abroad. In the same period, the population aged 15-64 slightly decreased, from 67.1% (2005) to 66.9% (2015). The average age of the population in Serbia increased from 40.6 years (2005) to 42.7% (2015). The average life expectancy of male and female population in Serbia has extended over the last ten years by more than two years (from 70.0 years to 72.6 years for men and from 75.4 to 77.7 years for women). Mortality rate rose from 14.4 to 14.6 deaths per 1.000 inhabitants. The leading causes of death are still circulatory diseases and neoplasms both with men and women. Depopulation tendencies of the population with negative growth and negative natural increase were recorded in Vojvodina at the beginning of 1980s, and the rest of Serbia at the beginning of the 1990s. The results of the Census 2011 show that the average population density in Serbia is 92.6 inhabitants per 1 km^2, however, intraregional population distribution is rather unequal. The population density of 513 inhabitants/km^2 in the *Beogradski region* is five times higher than that in other regions. Serbia is ethnically a multinational community. In addition to Serbs (83.3%), the most numerous are Hungarians (mostly in the *Region Vojvodine*), then Roma people (the *Region Juzne i Istocne Srbije)* and the Bosniaks (mainly in the *Region Sumadije i Zapadne Srbije*). Of the total number of Serbia population aged over 15, 48.9% have completed secondary school, while one over six inhabitants has attained tertiary education. In Serbia, 34.2% of persons aged 15 and over are computer literate, while 14.8% are partially literate, meaning that they know how to perform one of the basic computer activity (text processing, tabulation, sending/receiving e-mails and web browsing), but not very fourth person.[105]

In Serbia, in the Census of Population 2011 enumerated were 2,487,886 households, and when compared to 1948 their number has increased by about 1.7 times (growth index is 168.9). Over 1948 – 2002 there was continuous increase of households accompanied by constant decrease of their average size. The largest changes in the structure of households by the number of members, between the 2002 and 2011 Censuses are noted with one-person and four-person households. Namely, the share of one person households in the total number of households has increased from 20% to 22.3%, while the share of four-person households has decreased from 21.3% to 18.2%. One-person households are the most numerous in the Region Vojvodina (29.6%), while every third multi-member, non-family household (e.g. a household composed of brother and sister) is in the *Beogradski region* (34.4%).[106]

[104] Statistical Yearbook of Republic of Serbia 2016, Statistical Office of the Republic of Serbia.
[105] Statistical Yearbook of Republic of Serbia 2016, Opus Cit.
[106] Statistical Yearbook of Republic of Serbia 2016, Opus cit.

6.2. KEY INDICATORS

Indicator: Gross domestic product at market prices in PPS per capita[107]

GDP (gross domestic product) is an indicator for a nation´s economic situation. It reflects the total value of all goods and services produced less the value of goods and services used for intermediate consumption in their production. Expressing GDP in PPS (purchasing power standards) eliminates differences in price levels between countries, and calculations on a per capita basis allows for the comparison of economies significantly different in absolute size. When comparing Serbia, for this indicator, with Danube region average a huge difference could be seen. During the referent period Serbia recorded an increase from modest EUR 8,600 in 2007 till EUR 10,700 in 2016 while Danube region average was EUR 18,650 in 2007 and EUR 22,470 in 2016. This shows that Serbia had an increase of 24.42% for the referent period while Danube region countries recorded an increase of 20.48% but relating to absolute figures in 2016 Danube region average was higher than Serbian for 210%! More unfavourable figures for Serbia are when they are compared to EU-28 countries average. In 2016, EU-28 average was higher compared to Serbia for 272%!

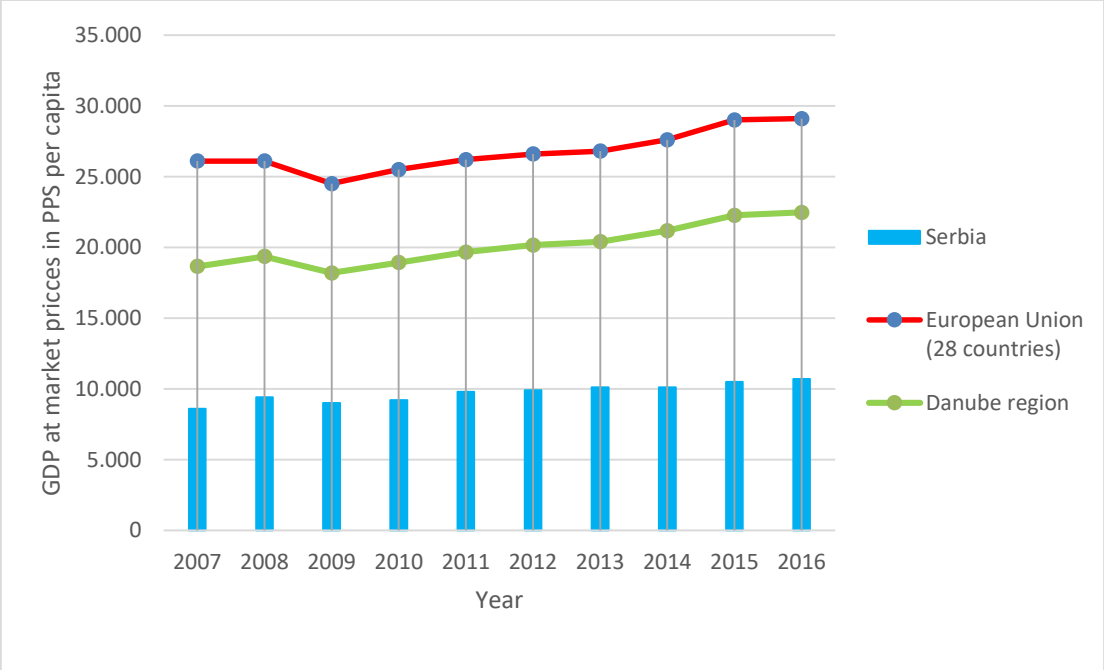

Figure: Gross domestic product at market prices in PPS per capita in Serbia, the EU and the Danube region

OBSTACLE: Low GDP suggests that Serbian economy is at low level of activity on one side, and that it is not competitive as a whole on the other side. As a result of this, tiny government budgets are available for different purposes as well as to support eco-innovations.

[107] Economy main indicators Database – Indicator 1.1

Indicator: Real GDP growth (% change compared with the previous year; % per annum)[108]

When it comes to real GDP growth Serbia recorded more or less the same trend in comparison to Danube region as well as EU-28 countries with an exception in 2014. Then Serbia recorded negative growth of -1.8% while Danube region average was 1.67% and EU-28 was 1.6%. During the referent period Serbia recorded maximum in 2007 with 5.9% while for Danube region was 5.58% and for EU-28 3.1%. On the other side, Serbia recorded minimum in 2009 with -3.1% but it was over EU-28 (-4.4%) and particularly in comparison with Danube region countries average (-5.52%).

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
EU-28 (¹)	3,3	3,1	0,4	-4,4	2,1	1,7	-0,5	0,2	1,6	2,2
Danube region	5,68	5,58	3,71	-5,52	1,46	1,77	-0,48	0,85	1,67	2,63
Serbia	4,9	5,9	5,4	-3,1	0,6	1,4	-1,0	2,6	-1,8	0,8

Figure: Real GDP growth (% change compared with the previous year) in Serbia, the EU and the Danube region

OBSTACLE: Oscillating character of real GDP growth suggests that there is no promising trend in Serbian economy that could lead to substantial improvement of GDP in general. That means there won't be significant government and business funds for dealing with eco-innovation in longer term.

Indicator: Employment rate as a share of total population of age group 20-64[109]

Employment rate in Serbia is significantly lower in comparison to both EU-28 countries average and Danube region countries average as well. Serbian employment rate varied in reference period (2008-2015) between 45.3% in 2012 and 53.7% in 2008. In 2015 employment rate was 52% what is for 4.17% lower value in relative way in comparison to 2008. During the period 2007-2016 EU-28

[108] Economy main indicators Database – Indicator 1.2
[109] Economy main indicators Database – Indicator 2.1

countries recorded pretty high employment rates and they vary between 68.4% in 2012 and 2013 and 71.1% in 2016. In last year of the reference period for Serbia, in 2015 it has lower employment rate in comparison to EU-28 average for that year EU-28 average was for 25.82% in relative way. Danube region countries average values for this indicator were slightly behind EU-28 countries average during the whole referent period.

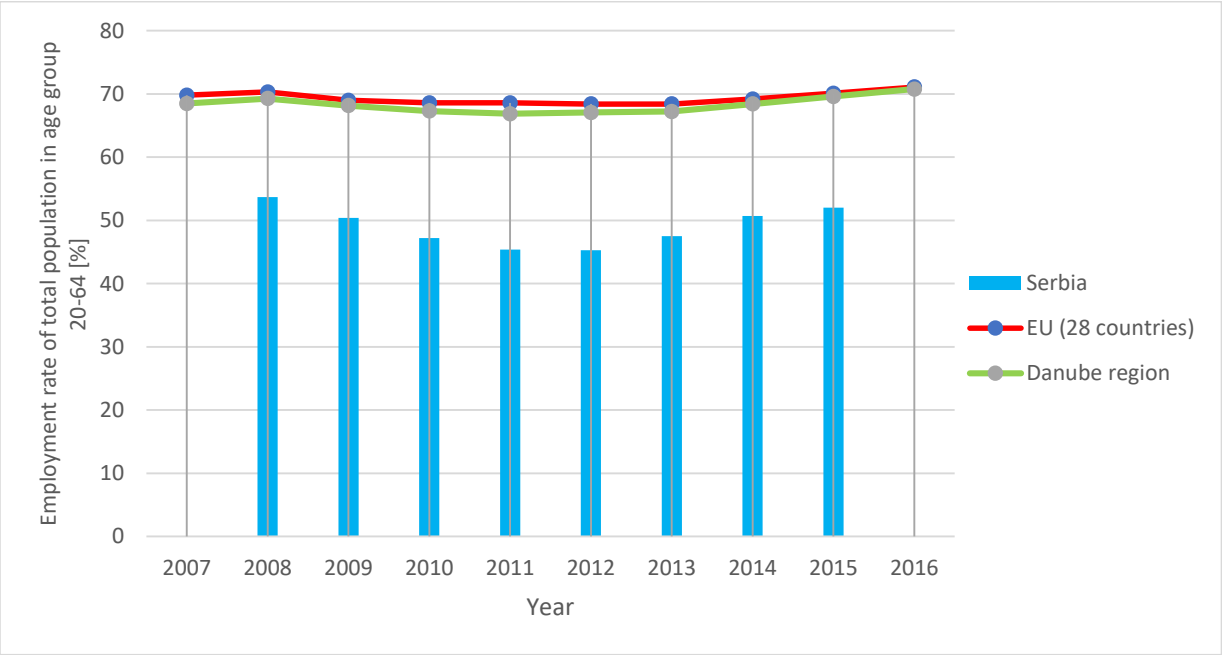

Figure: Employment rate as a share of population age 20-64 in Serbia*

OBSTACLE: Unfavourable figures relating employment rate for Serbia are even worse knowing that in country exists so called fictitious employment in governmental sector. On the other side, employment in real sector is at relatively low rate and hardly bears government expenditures. In these circumstances there are small rooms for eco-innovations.

Indicator: Unemployment rate as a share of active population[110]

When it comes to unemployment rate in Serbia available figures shows same trends like in case of employment rate and they are unfavourable in general. Unemployment rate in Serbia in reference period (2008-2015) varied between 14.4% in 2008 and 24.6% in 2012. In 2015 unemployment rate was 18.2% what is for 7.91% higher value in relative way in comparison to 2008. During the period 2008-2016 EU-28 countries recorded pretty low unemployment rates and they vary between 7% in 2008 and 10.9% in 2013. In last year of the reference period for Serbia, in 2015 it has almost double for double higher unemployment rate in comparison to EU-28 average (18.2% vs. 9.4%). Danube region countries average values for this indicator were slightly behind EU-28 countries average during the whole referent period with exception for 2016 when EU-28 average was 8.6% while Danube region average was 7.09%.

* Statistical office of the Republic of Serbia keeps this indicator for age group of 15-64

[110] Economy main indicators Database – Indicator 2.1

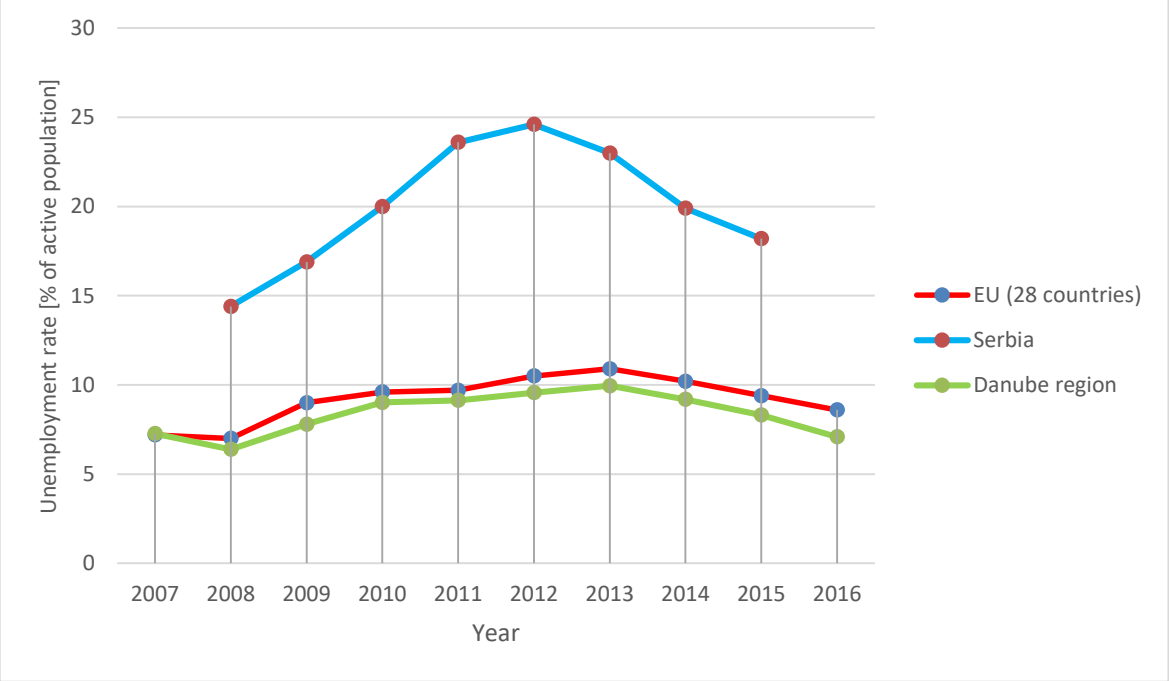

Figure: Unemployment rate as a share of active population in Serbia*

OBSTACLE: So high unemployment rate in Serbia, particularly among youth population, contributes to social tensions and continuing to emigration long-term trend. In these circumstances there are small rooms for eco-innovations.

Indicator: Minimum wages[111]

Relating to minimum wages in Serbia there are comparable data only for last three years in referent period, from 2013 to 2015. Available data suggests that Serbia has lower minimum wages in comparison to both Danube region and Moderate innovator countries as well. Data also suggest that minimum wages in Serbia slightly went down for 3 three years while in two groups for comparison the opposite trend has been identified. In 2015, Serbia recorded for 18.1% lower minimum wages in comparison to Danube region countries while in comparison to Moderate innovator group of countries average it was 29.84%.

* Statistical office of the Republic of Serbia keeps this indicator for age group of 15-64

[111] Economy main indicators Database – Indicator 3.3

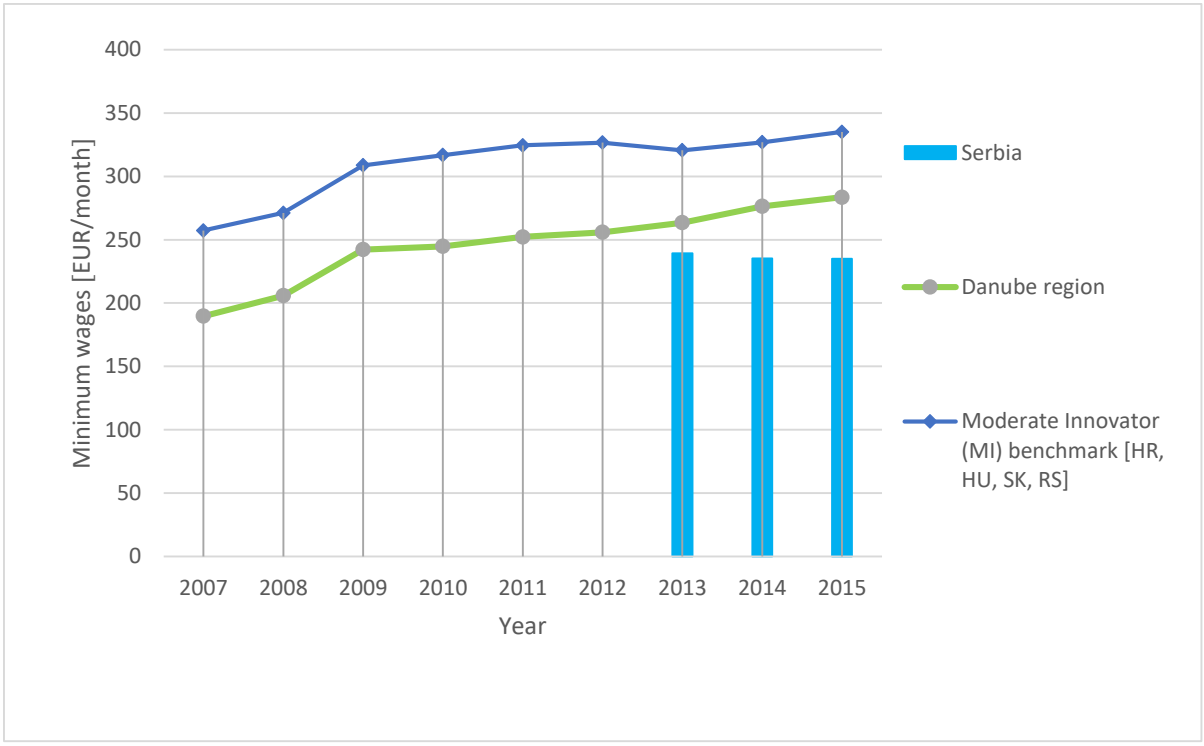

Figure: Minimum wages in Serbia compared with the Danube region and MI countries

OBSTACLE: The low level of minimum wages in Serbia suggests that it is a country where the low paid workforce is socially acceptable. That creates an approach among employers that their competitiveness could be based on cheap workforce rather than on innovation. Eco-innovation in these circumstances is not a daily issue and their lack isn't obvious because of unawareness of their importance.

Indicator: Industrial confidence indicator[112]

This indicator is based on business surveys which provide a rapid means of compiling simple statistics with the results available before those of traditional statistical methods, and provide also information on areas not covered by quantitative statistics Consumers provide very high quality information on their purchasing information and price trend. For the referent period from October 2016 till September 2017 Serbia has been positioned differently in comparison to Danube region countries as well as to EU-28. From the beginning of the referent period till June 2017 Serbia recorded higher industrial confidence indicator in comparison to both groups. Highest index during the referent period was recorded by Serbia in May 2016 and it was 7.20, while Danube region countries average was 3.89 and EU-28 was 3.20. At the end of the referent period, in September 2017, Danube region countries average was 6.92, EU-28 was 6.70, while Serbia recorded only 5.40 for this index value.

[112] Economy main indicators Database – Indicator 4.1

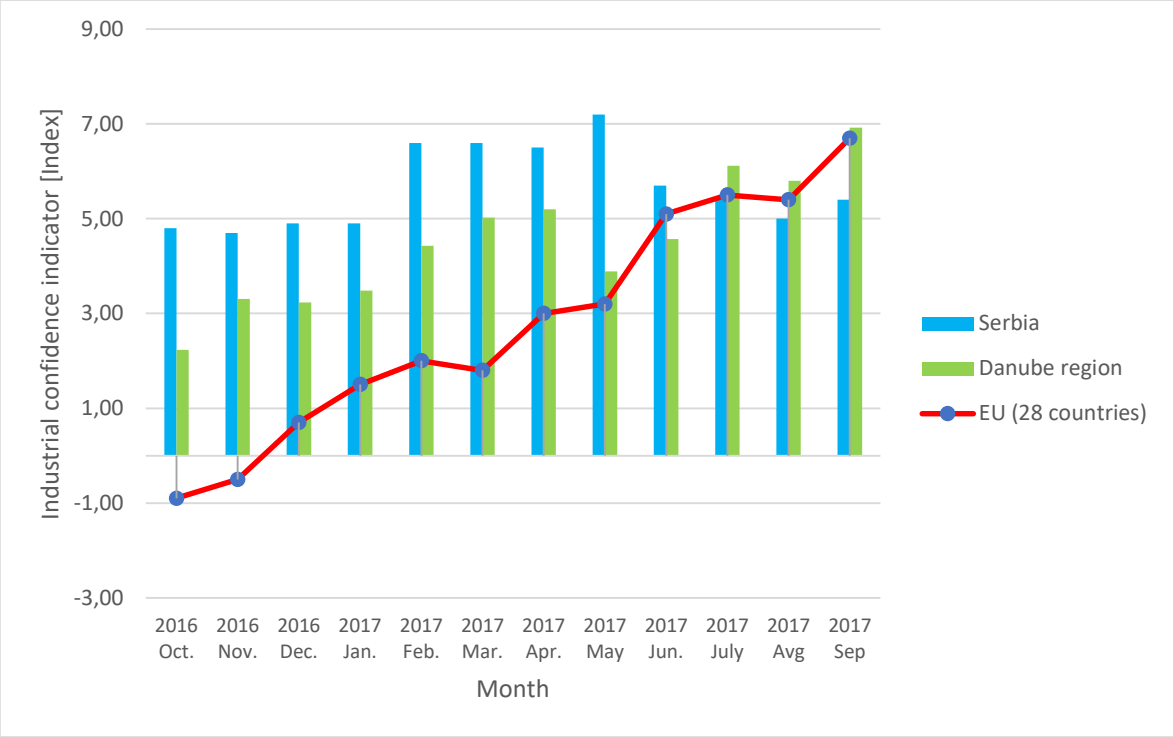

Figure: Industrial confidence indicator for Serbia compared with the EU28 and the Danube region

OPPORTUNITY: As a component indicator of the Economic Sentiment Indicator, which is updated monthly,, industrial confidence indicator suggests that there is a solid base for industrial confidence in Serbia. That means that there is a relatively good mood about Serbian industry expressed by businesses and consumers as well. However, this mood could be changed in short-term and lead to losing this confidence which later couldn't be restored so easily.

Indicator: Services confidence indicator[113]

When it comes to next confidence indicator which is related to the services, Serbia recorded decrease of its value during the referent period, from 15.50 in October 2016 down to 9.30 in September 2017. On the other side, Danube region countries average was permanently over the Serbian and even EU-28 average during the whole referent period, with its maximum in July 2017 with 20.70 while EU-28 was 12.40 and Serbia recorded 13.1. However, at the end of referent period Danube region countries kept significantly high value of this index as 19.42 while EU-28 was 12.50 and Serbia recorded its minimum with only 9.30.

[113] Economy main indicators Database – Indicator 4.2

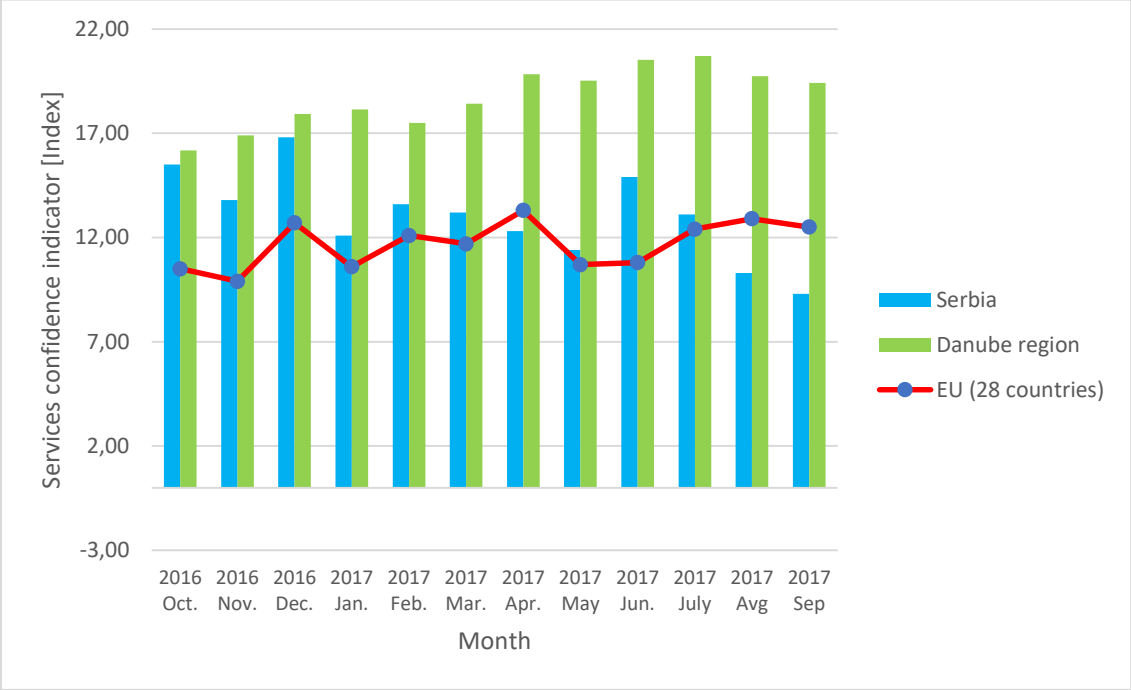

Figure: Services confidence indicator for Serbia compared with the EU28 and the Danube region

OPPORTUNITY: As a component indicator of the Economic Sentiment Indicator, which is updated monthly, service confidence indicator, suggests that there is a solid base for service confidence in Serbia. That means that there is a decent optimism level about Serbian services sector expressed by businesses and consumers as well. However, this mood could be changed in short-term and lead to losing this confidence which later couldn't be restored so easily.

Indicator: ESI – Economic sentiment indicator[114]

The Economic Sentiment Indicator (ESI) is a composite indicator made up of five sectoral confidence indicators with different weights: Industrial confidence indicator, Services confidence indicator, Consumer confidence indicator, Construction confidence indicator Retail trade confidence indicator. Confidence indicators are arithmetic means of seasonally adjusted balances of answers to a selection of questions closely related to the reference variable they are supposed to track (e.g. industrial production for the industrial confidence indicator). For the referent period from October 2016 till September 2017 Serbian figures varied significantly relating to its trend as well as in comparison to referent groups (Danube region and EU-28). At the beginning of the referent period, since October till December 2016, Serbia recorded higher values for this indicator in comparison to both referent groups. In December 2016 Serbian value for this indicator was 115.00 while Danube region recorded 110.21 and EU-28 average was 109.00. Then in January 2017 indicator value dropped to109.20 but improved in forthcoming months reaching its maximum in March 2017 with 117.20 while Danube region average was 111.63 and EU-28 was 109.20. After another similar trend in April 2017, Serbian economic sentiment indicator started to heavily falling down since July 2017 till the end of the

[114] Economy main indicators Database – Indicator 4.3

referent period. In September 2017, Serbia recorded 109.90, what is just for 0.30 higher than from the beginning of referent period. On the other side, Danube region countries average in September 2017 was 113.21 what is for 5.87 higher value (+5.47%) in comparison to the October 2016, while EU-28 countries average improved for 6.2 (+5.80%) during the referent period.

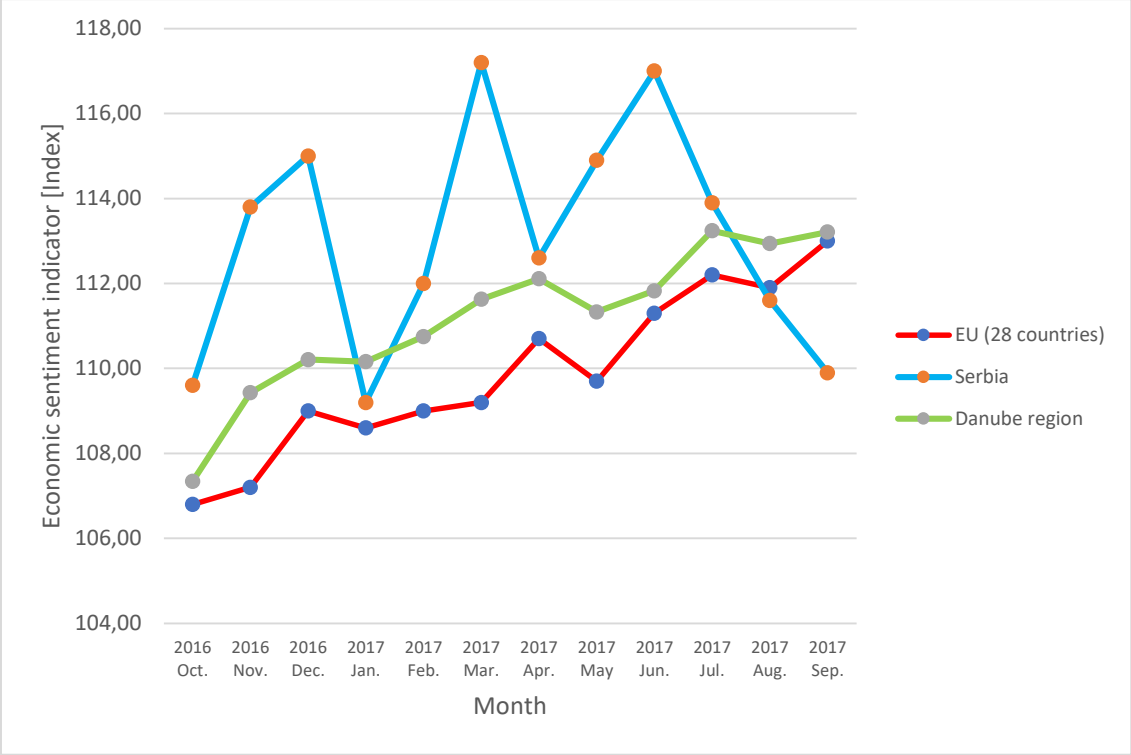

Figure: Economic sentiment indicator for Serbia compared with the EU28 and the Danube region

OPPORTUNITY: As a composite indicator which is updated monthly, economic sentiment indicator suggests that there are optimistic indices toward Serbian industry, services, consumers, retail trade as well as construction. However, this information collected in a rapid manner is not yet reflected in aggregate economic variables, but could be a good signal for different researchers and investors as well.

Indicator: CPI- Corruption perception index[115]

The CPI scores and ranks countries/territories based on how corrupt a country's public sector is perceived to be. It is a composite index, a combination of surveys and assessments of corruption, collected by a variety of reputable institutions. Serbian CPI shows that public sector is perceived as highly corrupted. Minor improvements are achieved during the referent period but CPI suggests that Serbian public sector is still highly corrupted. While Serbian values for CPI vary between 39 and 42in the referent period (2012-2015) Danube region countries average varied between 51.73 and 53.73. On the other side, as less corrupted countries in EU are perceived Scandinavian ones, where Denmark recorded highest values for CPI in the referent period, between 90 and 92.

[115] Economy main indicators Database – Indicator 4.5

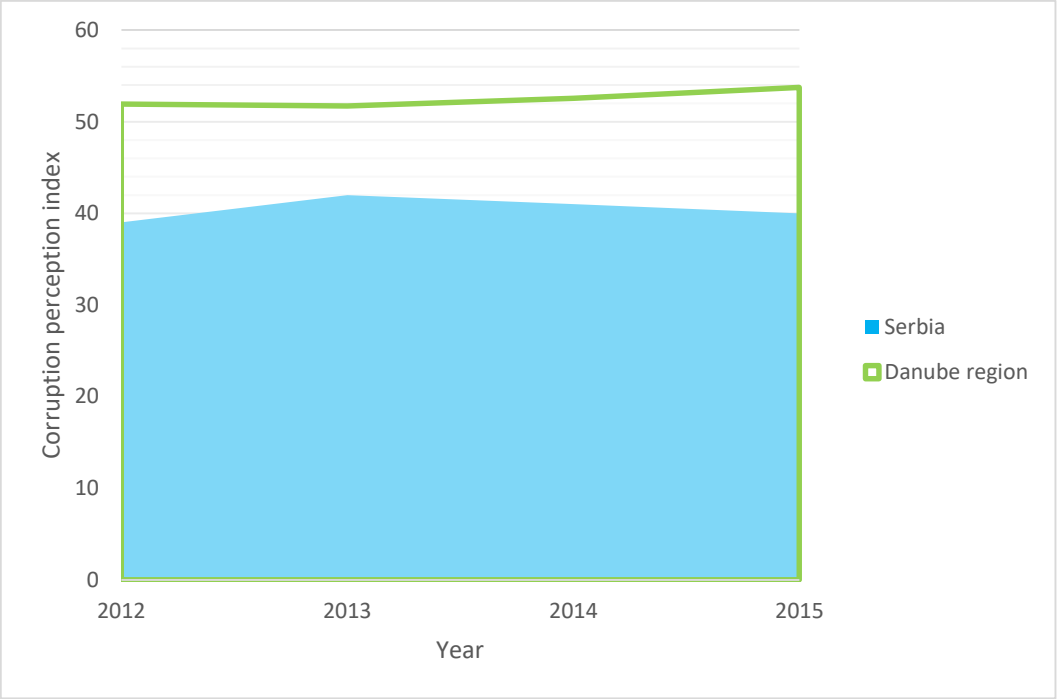

Figure: Corruption perception index in Serbia compared with the Danube region

OBSTACLE: According to CPI Serbia belongs to average corrupted countries but still behind Danube region countries average and far behind Scandinavian ones. It means that businesses and citizens suffer in performing their operations related to government at different levels. In corrupted environment there are small rooms to deal with eco-innovations.

7. CONCLUSION

When it comes to **eco-innovations**, the main conclusion is that eco-innovation issue in Serbia is in "shady" area. In order to enlighten it and bring it to public agenda as a first step it is necessary to create and/or integrate numerous indicators organised in 5 groups of eco-innovation indicators: ***Eco-innovation inputs***, *E****co-innovation activities, Eco-innovation outputs***, ***Resource efficiency outcomes*** and ***Socio-economic outcomes***.

Based on indicators presented in this report main conclusions are presented below.

There are many critical areas in Serbia that should be improved in order to achieve progress in eco-innovations. Even with significant advances in the development and modernization of Serbia's R&D and innovation system, the country must overcome important challenges before it can realize the full potential of the reforms. First, public and private investment in research remains low, with Gross Expenditures for Research and Development (GERD), at less than 1 percent of Gross Domestic Product (GDP), significantly lagging the EU average. Moreover, investments are based in favor of basic, as opposed to applied, science, and are weakly linked to the needs of the business sector, disconnected from areas of revealed competitive advantage, and, too often, seem distributed on the basis of backward looking criteria. Second, the number of researchers has been steadily declining, due to brain drain and aging of the research population. Finally, the present system for the allocation of funding underrates the importance of the nexus between research and business, as well as the need for early stage innovation financing. A systemic (public and private) approach to the R&D and innovation system, its functioning, and its financing levels could help lift Serbia out of a pattern of low growth by increasing the scope for a modern technologically advanced and dynamic private entrepreneurial sector.[116]

However, there are few opportunities that Serbia should use in order to join eco-innovation activities. First of all they are various budgets from local level up to the governmental one with revenues originated from environmental taxes. These budgets should be used for their purpose – environmental issues and not to be spent to solve problems in other areas. Secondly, relatively strong indices that could be assessed as opportunity for eco-innovation concept promotion and implementation in Serbia is related to general impression on domestic industry services, consumers, retail trade as well as construction that is relatively good, according to businesses and consumers as well. This impression, articulated as a confidence is still high in spite of relatively low aggregate economic variables.

As a general conclusion could be stressed that Serbia is out of numerous joint official statistics available at Eurostat. This way, the country is not comparable with other EU and non-EU countries

[116] Western Balkans Regional R&D Strategy for Innovation, Country paper series: Serbia. World bank technical assistance project (p123211).October 2013

relating to numerous indicators that this organization follows. Statistical office of the Republic of Serbia as a national organization has available only basic indicators for the country neglecting numerous in-depth indicators particularly in innovation and environment protection.[*] This is the main reason why this report is not prepared in full scale. However, based on available data, some conclusions have been made.

[*] Some necessary data for this report are available at different sources but in many cases they are inconsistent with Eurostat ones.

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