Interreg
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NATIONAL REPORT ON O&O – SLOVENIA

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ACTIVITY 3.2	Analysing the environment for ecoinnovation in partner countries
DELIVERABLE 3.2.2	National report on obstacles and opportunities

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1. ABSTRACT

Slovenia is one of the smallest EU countries, both in terms of its residency as well as territory and has faced many challenges brought about with the altered global conditions, in addition to the challenges that are inherit to small countries, however, it still holds up a very high standard of living. The country has very good infrastructure, a well-educated work force, a strategic location between the Balkans and Western Europe, and one of Central Europe's highest per capita GDPs. Being considered as a strong innovator, it is generally more suited to compare Slovenia with developed western countries rather than countries with transition economies. It`s main strengths of its innovation system remain in the area of human resources, firm investments and a relatively innovation-friendly environment. In previous years, Slovenia has made significant improvements, which have also upgraded the countries status in terms of eco-innovation performance, however, the aggregation of funds for research and development as well as product development and market penetration for "green" products/services is still very difficult.

Over the last decade, the energy sector in Slovenia has experienced major structural changes due to liberalisation of the electricity and natural gas markets as well as effects of climate and energy policy of European Union, which has reflected on the creation of policy at the national level. The primary energy sources for electricity generation in Slovenia are well balanced and utilize the largest possible share of domestically available sources. Each source, namely nuclear fuels, fossil fuels and renewable energy sources provide each on third of total electricity production. As far as it concerns renewable energy sources, promotion of the use of RES has an important place in the Slovenian energy policy. With improved energy efficiency and increased exploitation of energy sources from renewables, it is expected that greenhouse gas emissions will be reduced and greater security of energy supply would be provided. Renewables in Slovenia are in the biggest part presented by wood and other solid biomass and with large hydro power plants that play an important strategic role in electricity production. Other renewable energy sources, which represent a smaller share in energy consumption from are also liquid biofuels, biogas, solar (photovoltaic) and wind turbines. The long-term vision of the energy sector in Slovenia is a gradual transition toward a low-carbon economy by prioritizing efficient use of energy, utilization of renewable energy sources and development of active electricity distribution networks. The energy mix of the future will most likely strongly rely on nuclear energy and further development of hydroelectric power sources.

With regard to the environmental protection, Slovenia is improving as a result of the planned environmental policy and comprehensive environmental legislation adopted in recent years. The discharges of certain pollutants to air and water have been reduced, waste management has been improved, efforts to conserve biodiversity have been strengthened moreover, general public have better understanding of environmental challenges. However, state of the environment, in particular regarding air quality and soil contamination is still a major concern in certain locations.

The report was developed for the purpose of the EcoInn Danube project activity 3.2 - Analysing the environment for eco-innovation in partner countries. The main goal of the report is to present the national environment for eco-innovation in terms of main barriers and obstacles as well as challenges and opportunities from the unique perspective of Slovenia. It is focused on four key areas associated to eco-innovation including innovation in general, Energy, Environment and Economy.

All key fields were studied thoroughly and assessed with multiple indicators that were analysed and compared with the EU's and Danube region's average results. National report on obstacles and opportunities is one of three reports and will (together with other national reports from partner countries) present the analytical framework applied to develop the joint strategy for the Danube region.

2. OVERALL NATIONAL RANKING

This section provides an overview of the national ranking according to relevant composite indexes on innovation, namely the "European Innovation Scoreboard - Summary Innovation Index", the "Eco-Innovation Scoreboard" as well as the "Innovation Output Indicator – Composite Score".

European Innovation Scoreboard

The European Innovation Scoreboard ranks the performance of European Member States' innovation systems by applying 27 indicators aggregated into a Summary Innovation Index. Slovenia is the lowest ranked country in the category of strong innovators and the only one that does not meet the European average, missing it by about 4 %. Compared to 2010, Slovenia has regressed and was in 2016 a few percentage points lower in comparison to its best score obtained in 2011.

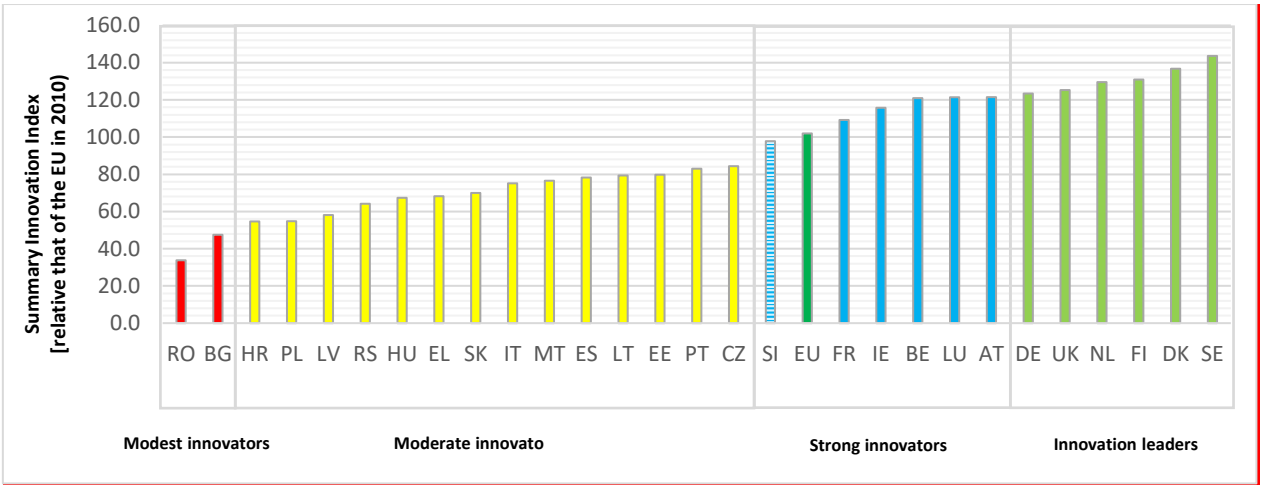


Figure 1: European Innovation Scoreboard – Summary Innovation Index, EU member states and Serbia, 2016 (Source: European Commission)

The reason for this negative change is the delayed effects of the global economic crisis, which was not properly addressed on the national level in due time. The long-term trend points to stagnation of the country compared to the European Union, especially to comparable neighbouring countries such as Austria, which has managed to improve its score significantly with respect to the 2010 benchmark. Despite this, Slovenia remains well above its other neighbouring countries as well as the Danube region, falling behind only Germany and Austria.

Table 1: Performance groups and ranking of the European Innovation Scoreboard - Summary Innovation Index

Country		Performance in 2016 relative to EU performance in 2016	Performance group
DE	Germany	121,0	Innovation Leader
AT	Austria	119,1	Strong Innovator
SI	**Slovenia**	**95,9**	**Strong Innovator**
CZ	Czech Republic	82,7	Moderate Innovator
SK	Slovakia	68,6	Moderate Innovator
HU	Hungary	66,1	Moderate Innovator
RS	Serbia	62,9	Moderate Innovator
HR	Croatia	53,6	Moderate Innovator
BG	Bulgaria	46,6	Modest Innovator

RO	Romania	33,1	Modest Innovator

Eco-Innovation Scoreboard

The Eco-innovation scoreboard is an index composed of a total of 16 indicators that compare the performance of eco-innovation systems of EU countries. The composite index consists of five major components that include inputs, outputs, activities efficiency outcomes and socio-economic outcomes relevant to the field of eco-innovation.

According to the summary index, Slovenia with a total of 104 points is second only to Germany (with 140 points) sharing the second place with equally scored Austria. Slovenia surpasses both the average of the Danube regions by a considerable margin, but only slightly with respect to the average of EU countries. It naturally falls short of reaching the SI benchmark due to the very high score of innovation leader Germany.

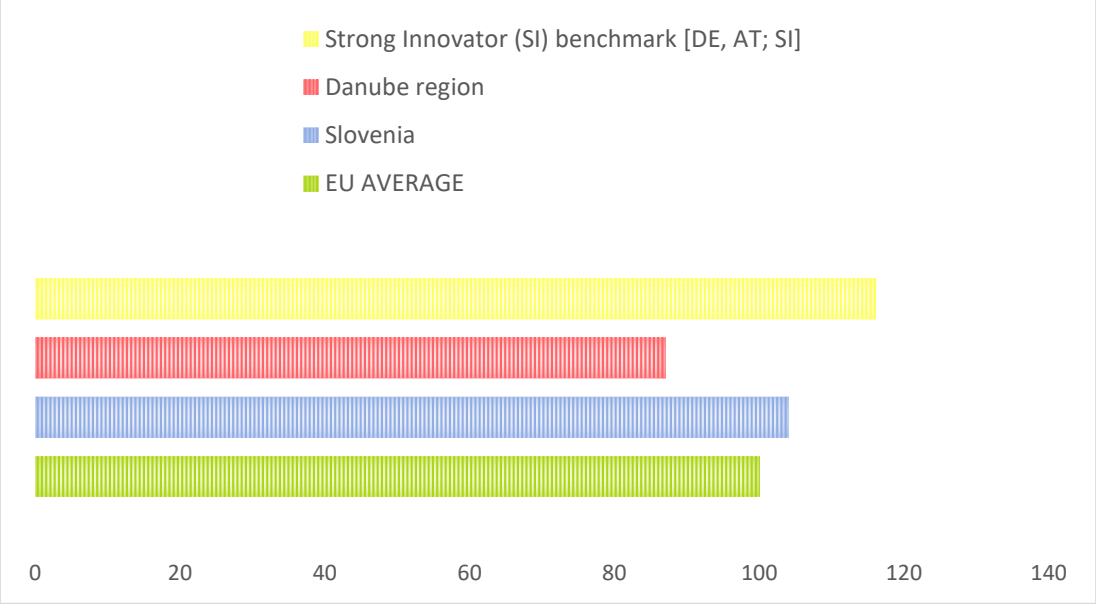


Figure 2: Eco-Innovation Index 2016, Composite Index (Source: Eco-Innovation Observatory)

Compared to 2009, when Slovenia was declared an "innovation follower" (EIS, 2009) improving its status from a "moderate innovator" in previous years, Slovenia has made significant improvements which have upgraded the countries status in terms of eco-innovation performance. In 2010, it still lagged the average of the European Union with an eco-innovation index of 93. It surpassed the EU average in 2011 and again in 2012, when it reached an index score of 110, achieving a 115% ratio compared to the EU average, which ranked Slovenia at number 7 (number 10 in 2011) on the eco-innovation scoreboard. However, in 2013, the financial and resulting economic crisis began to impact the national economy, whereby large declines in export activity, turnover and employment in general weighted down on the field of socio-economic outcomes. In addition, the economic downturn also resulted in increased political instability, which also played an important role in attracting new greenfield investments, which were basically non-existent in this period. Even so, material productivity doubled, personnel in research and development rose substantially, publications related to eco-innovation as well as new patents have been on the rise in the period from 2011 to 2013. In addition, reduced R&D expenditure from the government have been somewhat compensated by internal R&D expenditure of innovative companies with high value-added, mostly from the fields of the

automotive industry and mobility, electrical equipment and appliances, energy efficiency in buildings and sustainable construction. By 2014, the situation already drastically improved with the country almost reaching the EU average and index score parity with Austria at 98, where it stayed also in 2015. In 2016, Slovenia along with Austria was ranked as the 8th on the scoreboard at 104 points.

Innovation Output Indicator

The Innovation Output Indicator is used to monitor the extent to which innovative ideas and solutions are capable of reaching the market. It focuses on innovation output and is composed of several indicators including patent applications per billion GDP (in PPS), employment in knowledge-intensive activities as a percentage of total employment, share of medium and high-tech goods and services in a country's exports and employment in high-growth enterprises in innovative sectors. The observed period is from 2011 until 2014, when the final data is available. Slovenia has almost an identical trend for the composite indicator compared to the average of countries within the Danube region, marking a very slight growth of just below 2% in the period. Compared to other countries included in the SI benchmark, which have achieved a compound growth of almost 5%, especially Austria with more than 9%, its clear that the gap between these highly developed countries and Slovenia as well as other countries in the DR on the other side is widening.

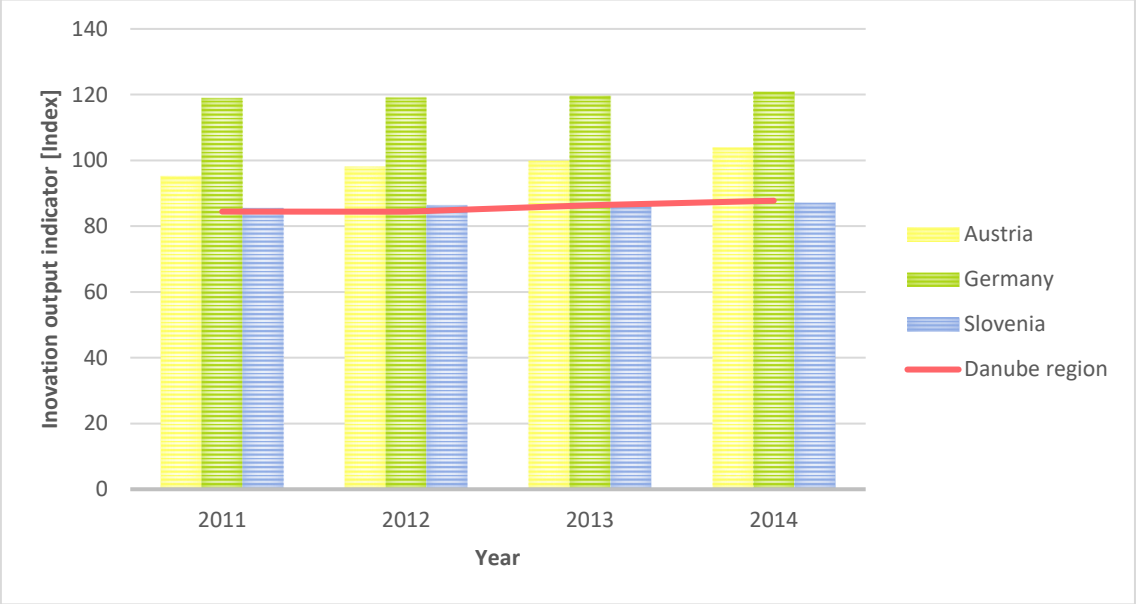


Figure 3: Innovation Output Indicator, 2011-2014 (Source: European Commission)

3. INNOVATION

3.1 EUROPEAN INNOVATION SCOREBOARD AND SUMMARY INNOVATION INDEX

Slovenia is considered along with Austria and Germany to be a strong innovator and is generally more suited to be compared with developed western countries rather than countries with transition economies. It`s main strengths of its innovation system remain in the area of human resources, firm investments and a relatively innovation-friendly environment.

Throughout the observed period from 2010 to 2016, the country has been slightly below the Summary Innovation Index average or EU countries, and far behind the benchmark of Strong innovators. The value of the index has been more or less constant, varying a maximum of only 1%.

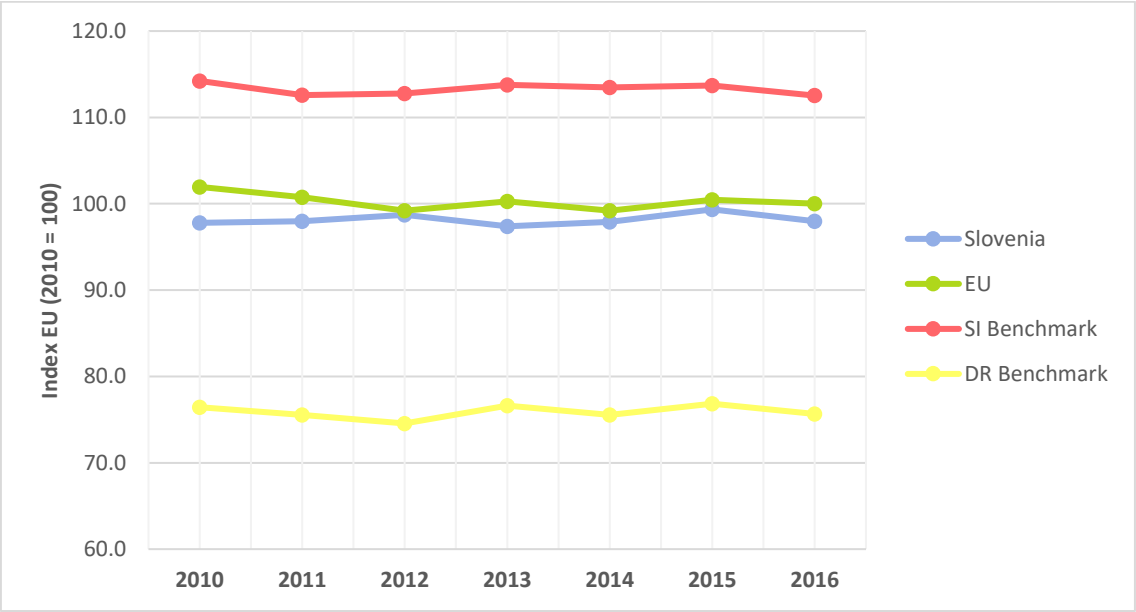


Figure 4: European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

Note: The Member States' performance in 2016 is shown relative to that of the EU average in 2010.

Slovenia is the lowest ranked country in the category of strong innovators and the only one that does not meet the European average, missing it by about 4 %. Compared to 2010, Slovenia has regressed and ranked few percentage points lower in 2016 in comparison to its best score obtained in 2011.
The reason for this negative change is the delayed effects of the global economic crisis, which was not properly addressed on the national level in due time. The long-term trend points to stagnation of the country compared to the European Union, especially to comparable neighbouring countries such as Austria, which has managed to improve its score significantly with respect to the 2010 benchmark. Despite this, Slovenia remains well above its other neighbouring countries as well as the Danube region, falling behind only Germany and Austria.

Table 2 presents the value of key indicators used in the development of the EIS in the areas of framework conditions, investments, innovation activities and impacts. It includes a benchmark value for the year 2010 and the final year of available data in 2016.

Table 2: European Innovation Scoreboard, Index, Slovenia, 2010 - 2016 (Source: European Commission)

	Performance relative to EU in year		Change 2010-2016
	2010	2016	
SUMMARY INNOVATION INDEX	98.0	97.8	-0.2
FRAMEWORK CONDITIONS			
Human resources	113.2	172.9	59.7
New doctorate graduates	100.0	234.1	134.1
Population with tertiary education	86.8	163.8	77.0
Lifelong learning	160.0	109.5	-50.5
Attractive research systems	76.3	101.6	25.3
International scientific co-publications	229.7	371.6	141.8
Most cited publications	66.7	80.8	14.1
Foreign doctorate students	35.6	35.6	-0.1
Innovation-friendly environment	138.3	114.3	-24.0
Broadband penetration	144.4	177.8	33.3
Opportunity-driven entrepreneurship	134.0	69.5	-64.6
INVESTMENTS			
Finance and support	50.9	40.4	-10.5
R&D expenditure in the public sector	85.8	66.2	-19.5
Venture capital expenditures	6.8	7.7	0.9
Firm investments	143.0	141.0	-2.0
R&D expenditure in the business sector	151.5	142.9	-8.6
Non-R&D innovation expenditures	114.5	118.5	4.0
Enterprises providing ICT training	157.1	157.1	0.0

INNOVATION ACTIVITIES			
Innovators	86.8	76.6	-10.2
SMEs product/process innovations	82.3	72.2	-10.1
SMEs marketing/organizational innovations	98.1	76.5	-21.6
SMEs innovating in-house	79.7	81.0	1.3
Linkages	129.0	105.7	-23.2
Innovative SMEs collaborating with others	130.8	119.9	-11.0
Public-private co-publications	144.9	106.2	-38.7
Private co-funding of public R&D exp.	113.7	93.8	-20.0
Intellectual assets	91.2	93.6	2.4
PCT patent applications	90.1	89.9	-0.2
Trademark applications	133.8	137.9	4.1
Design applications	60.0	64.6	4.6
IMPACTS			
Employment impacts	71.3	74.3	2.9
Employment in knowledge-intensive activities	98.7	102.6	3.8
Employment fast-growing enterprises	51.4	53.6	2.3
Sales impacts	87.8	75.7	-12.1
Medium and high tech product exports	107.2	102.3	-5.0
Knowledge-intensive services exports	31.7	34.6	2.9
Sales of new-to-market/firm innovations	130.1	91.8	-38.3

- *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;*
- *Brown: normalised performance below 50% of EU.*
- *Change highlighted in blue is positive; change highlighted in light red is negative*

3.1.1 Framework Conditions

Framework conditions are presented with 8 indicators in the areas of available human resources, state of systems for carrying out research and innovation-friendly environments. In 2016 Slovenia scored well above the European average in 4 indicators (new doctorate graduates, population with tertiary education, international scientific co-publications and broadband penetration). Improvements of these indicators ranged from 33.3% to no less than 141.8% from 2010. There was slightly better than average performance with respect to lifelong learning (109.5) although compared to 2010, this score declined significantly from 160.0 (- 50.5%). Under average results were documented in the area of most cited publications (80.8) and opportunity-driven entrepreneurship that scored 69.5, marking a 64.6 decline from 2010. The score for foreign doctorate students remained stagnant in the period with a very low score of 35.6.

Indicator: Population with tertiary education

In terms of the share of population in the age group of 25-34 that completed tertiary education in general, Slovenia has notably surpassed both the average of the EU as well as the Strong innovator benchmark in the year 2016 by 12,5% and almost 14% respectively. The share grew from only 31,3% in 2010 to 43% in 2016, marking a total 37% increase in the period. The positive trend has been most evident in years 2015 and 2016.

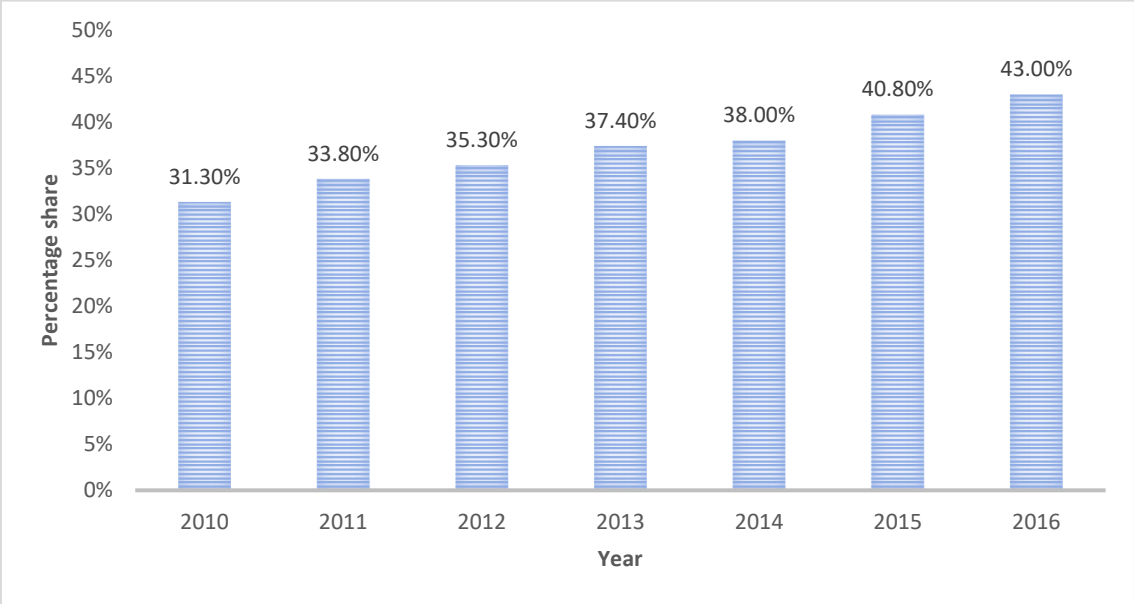


Figure 5: Population aged 25-34 having completed tertiary education (percentage share), 2010-2016 (Source: European Commission)

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

Slovenia has had on average 2.36 new doctorate graduates in the observed period, which is almost identical to the average of countries included in the SI benchmark and about 42% above the level of Danube region countries. From 2008 to 2012, this average was 1.58 when in 2013 there was an astounding 150% increase

with an average of 3.95. This only exemplifies the multiple decade long-term trend of increasing the number of tertiary education. However, the sudden substantial rise has a large deviation between the natural growth pattern and can only be explained by some external factors, including the increased availability of educational programs in cities other than Ljubljana and Maribor and shortening of duration of doctoral programs due to changes in the education system unfavourable to title candidates. It could also be presumed that the economic crisis and the scarcity of job openings led several highly educated students to continue with their studies as opposed to being unemployed.

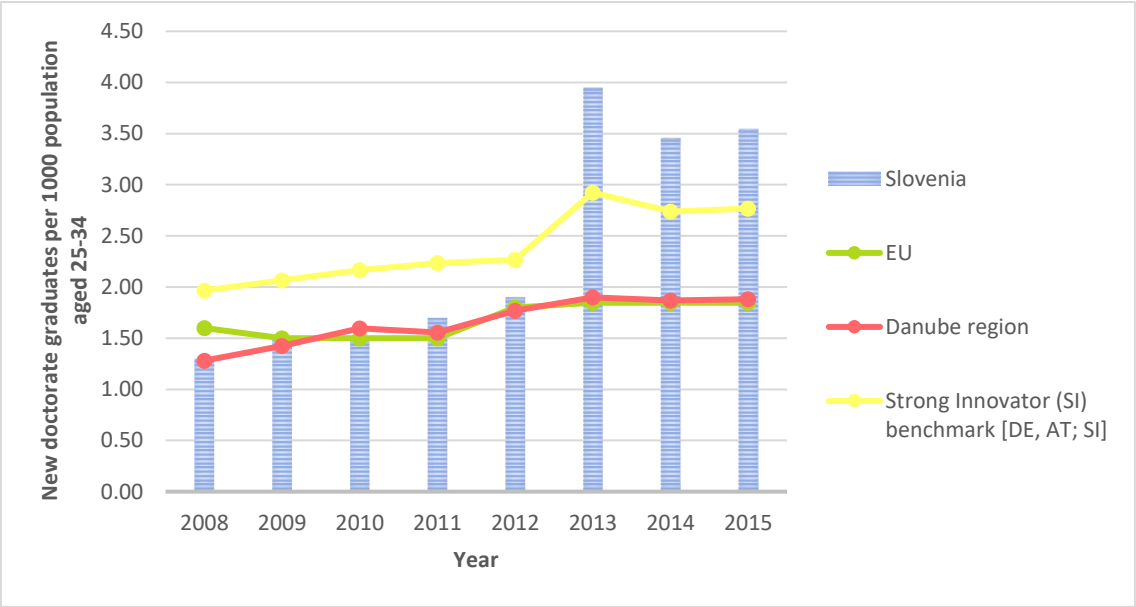


Figure 6: New doctorate graduates per 1000 population aged 25-34, European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

OPPORTUNITY: New doctorate graduates as a share of the population aged 25 to 34 substantially exceeds average of the EU, the Danube region and even the Strong innovator benchmark. The most new doctorate graduates obtained their title in the area of natural sciences as well as engineering and technology, which is the cornerstone of any innovation society. In addition, in the past the highest share of persons with a doctorate were documented in the age group from 35-54. This trend is now changing in favour of the younger group, as candidates conclude their studies earlier. Even though the conditions for researchers are far from ideal, many find opportunity abroad in leading R&D and technological companies, extinguishing themselves as experts on the international level, which can have enormous upside if at some point, they continue their professional carrier in Slovenia.

Indicator: International scientific co-publications per million population

Slovenia has a very strong scientific tradition that has contributed immensely to the global body of knowledge with inventions and findings for centuries. Co-publications of international team in globally present scientific and research media is a good proxy that can show the quality of research carried out.
With 1128 international co-publications for each million of the countries populous in 2016 alone Slovenia surpassed the average of both the EU and the Danube region by 128% and 89% respectively. The upward positive trend that can also be seen for the entirety of the Danube region compared to the EU, which is experiencing slower growth in the observed period and is even more expressed for Slovenia, which is second

only to Austria (regarding countries in the Danube region) that achieved 1336 publications in the same period. International co-publications in the Danube region grew by almost 52% (from 392,4 in 2010 to 596,3 per million of population in 2016), while Slovenia managed a growth rate of almost 58% (up from 714,2 in 2010) surpassing also the Strong innovator benchmark with Germany remaining at a modest 778,2 such publications in 2016.

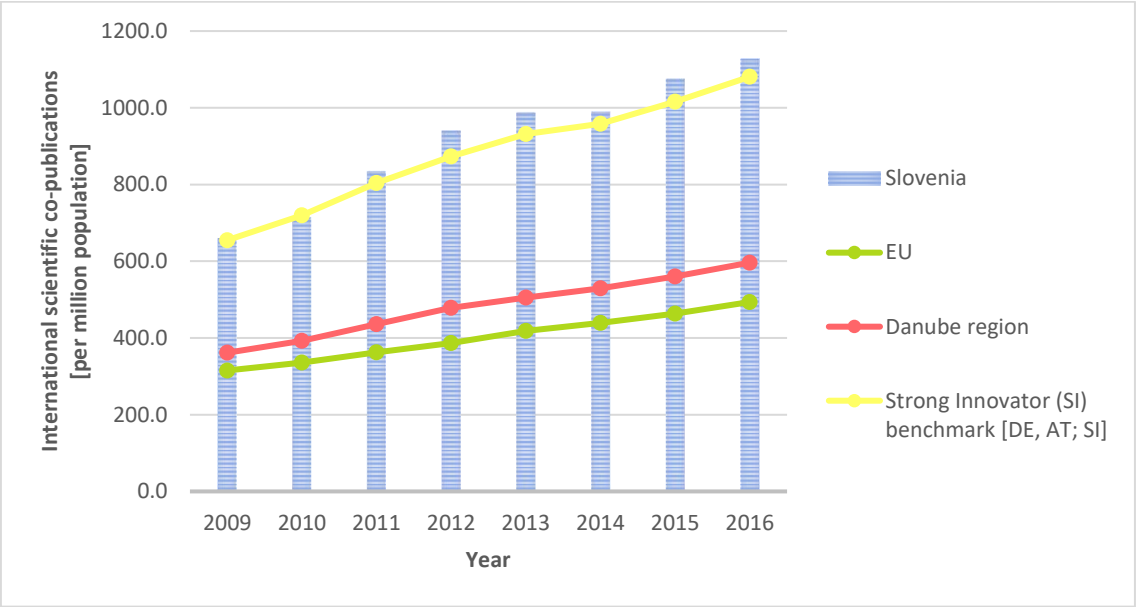


Figure 7: International scientific co-publications [per million population], European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

OPPORTUNITY: In comparison to both, the EU-28 and the Danube Region, Slovenia has a very high rate of international scientific co-publications. There is a good opportunity to improve the transfer of such high-level findings into marketable value propositions, however many of high ranking researchers can`t find gainful employment in their field of expertise on the national level, which is a severe loss of potential for a country that in the most part, financed their education and in some case also co-financed their research. Efforts must be made to maximize these potential benefits on the national level, however such a high share of international co-publications clearly marks a valuable opportunity for the country as a whole.

Indicator: Scientific publications among the top 10% most cited publications

Compared to the very high rate of international co-publication of Slovenian scientists, on average the publications that rank amongst the top 10% with regard to the frequency of their citation are well below the average of the European Union as well as the Strong innovator benchmark. In 2015, only a share of 8.6 % of all publications reached the 10% threshold. The situation improved by almost 20% in the period from 2010 to 2015, while the growth of the EU and the combined average of Austria and Germany was only 2,8% and 7,2% respectively, so the country has managed to somewhat reduce the gap. The growth of the countries in the Danube region basically stagnated in the period from 2011 to 204, but still managed an average growth of 6.3%, meaning that is has decreased it`s gap with the European Union but still lag far behind the Strong innovators.

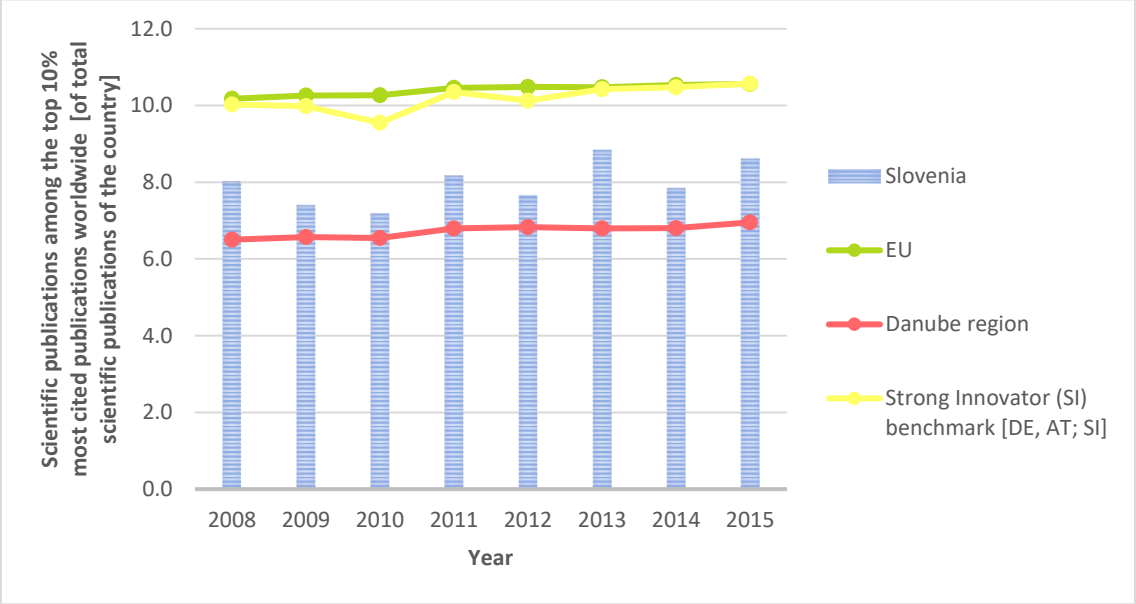


Figure 8: Scientific publications among the top 10% most cited publications worldwide [of total scientific publications of the country], European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

OBSTACLE: Visibility of scientific publications play an important role on their relevancy in terms of their actual impact. Compared to the high rate of international scientific co-publications the observed values are considered too far away from the desired level of the SI benchmark. It implies that passing on newly acquired knowledge to actual patents or better yet actual commercialization of products that base upon them is hindered and can present a relevant obstacle in the future output of the national innovation systems in the future.

Indicator: Opportunity-driven entrepreneurship (Motivational index)

Opportunity-driven entrepreneurship is defined as early-stage entrepreneurial activity of persons who state that their main driving force is opportunity rather than necessity, finding no other option for work. Adversely, necessity-driven entrepreneurship is business activity of persons strictly involved because there are no better options regarding their gainful employment. The motivational index is calculated as the ratio between both poles, persons involved in improvement-driven and necessity-driven entrepreneurship. Countries with more supportive environments for innovation have higher predominates of opportunity-driven entrepreneurship focused on improvement of a products, services or processes, resulting in a higher motivational index. The index for Slovenia has significantly dropped from the value seen in 2009 and 2010, when the value was 6.9 and 5.4 respectively. Until 2015 the motivational index surpassed or was on par (2011) with the average for the EU as well as the SI benchmark. In 2015 and 2016, record minimums were reached at only 2.0 and 2.1. The index reduced in value more than threefold in the observed period and was very near the average of the countries in the Danube region, whereby the Danube region in general has not experienced such a noteworthy decline (many countries have improved the index substantially for e.g. Hungary and the Czech Republic).

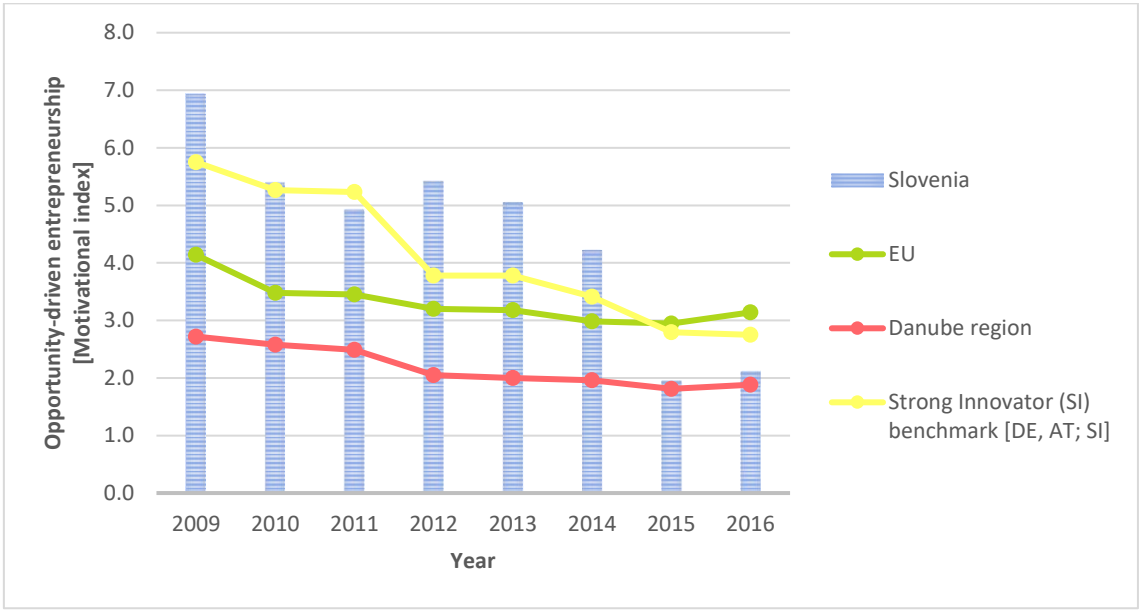


Figure 9: Opportunity-driven entrepreneurship (Motivational index), European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

OBSTACLE: The drop of the share of opportunity-driven entrepreneurship indicates that, despite several funding mechanisms, public support schemes, employment subsidies, etc. for start-ups and SMEs being available in the time, on average there was not enough opportunities and incentives for early-stage business to focus on improvement of products, services or processes. There are several factors contributing to the negative outcome of this indicator, most important of which are an inefficient national labour market, products, services and processes must be developed for the international market (national market too small) where the competition is very strong and poor employment stability in such companies that inclines the work force to seek gainful employment elsewhere. Generally, the very low value in addition to a sharp negative trend point out that the factors contributing to a non-favourable environment for opportunity-driven entrepreneurship can be seen as a clear obstacle.

3.1.2 Investments

Of the five indicators included in the Summary Innovation Index for the observation of investments in innovation, Slovenia has done very well in area of R&D expenditure in the business sector and the share of enterprises providing training to develop of upgrade ICT skills of their personnel. It also surpassed the EU average (2010: 114.5, 2016: 118.5) in the sector of non-R&D innovation expenditures expressed as a share of turnover, where a positive trend was also observed (up for 4.0% from 2010). Slovenia does very poorly in the field of venture capital expenditures and R&D expenditures in the public sector as a share of GDP, where 40.4% and 66.2% of normalised performance of the EU in 2016 was documented (concluding a drop of -10.5% and -19.5% in the observed time period).

Indicator: R&D expenditure in the public sector (percentage of GDP)

In 2015, Slovenia allocated 0.53% of its GDP to fund research and development activities in the public sector, including the government and higher education. This represents only 74.65% of the European Union member

states average. In the last years the average of countries in the Danube region also surpassed Slovenia with almost a 13% difference noted in 2015.

R&D expenditure in the period from 8007 to 2015 shows that the trend for the European Union has stagnated from 2008 with about 0,7% of GDP, rising only a modest 12,7% in 7 years, while the Danube region is demonstrating a trend of substantial growth with an increase of over 24% from 2008.

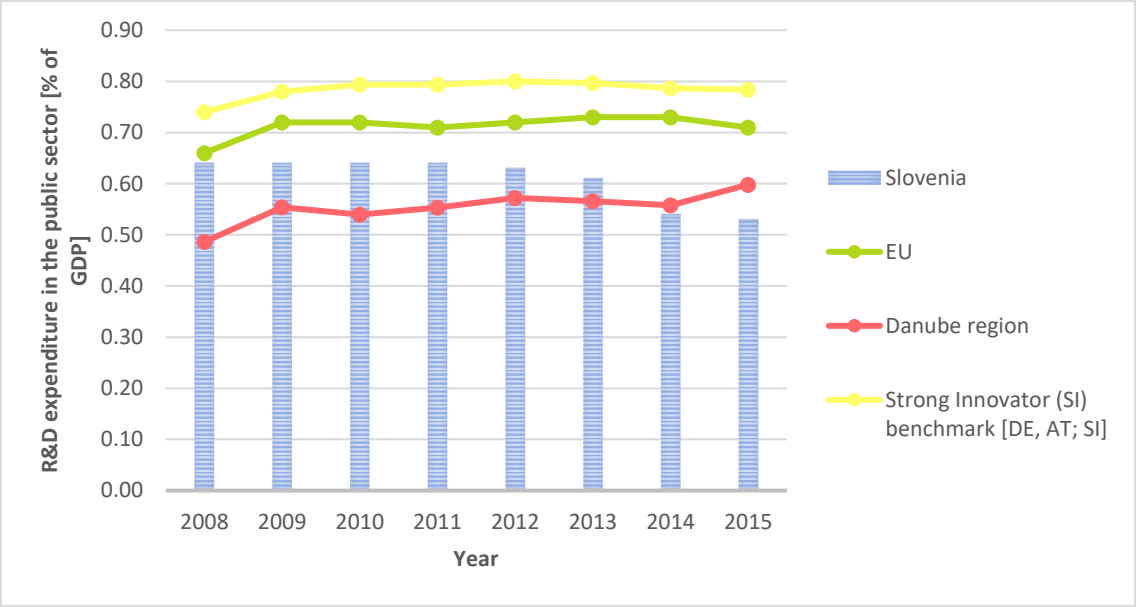


Figure 10: R&D expenditure in the public sector as a share of GDP, 2008-2015, European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

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 Slovenia is underinvesting in such activities.

Indicator: Venture capital as a share of GDP

While the share of private equity investment by firms or funds to small, early stage companies as a share of GDP has been on a decline in the EU from 2008, Slovenia has not managed even to come close to the Unions average. The investment uptake was documented from 2008 to 2011 (0.016%), followed by a stagnation and a decline until 2015, when the share once again reached its 2008 baseline of 0.007%. In 2015 Slovenia falls short of the EU average (0.063%) by more than 8 times, and fails also to reach the benchmark of the Danube region

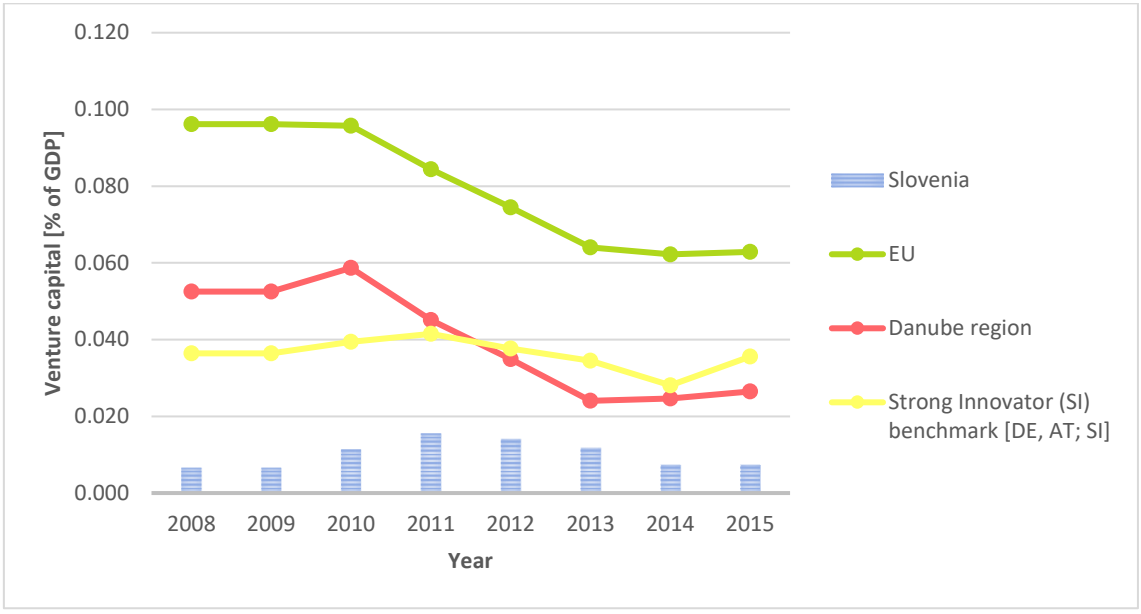


Figure 11: Venture capital as a share of GDP, European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

OBSTACLE: Venture capital has been mostly interested in start-up companies based on innovation technology, of which there is a wide plethora found in Slovenia. The indicator can provide a good proxy of the perception of foreign capital about the attractiveness to invest in certain country. The problem with the low share of venture capital, especially compared to the EU and the neighbouring countries, has to do with a rigid administrative environment, high taxes for employment and corporate profits as well as a perception of political instability that has been particularly prevalent from 2011 to 2014. Slovenia should improve the framework conditions that prohibit investment in the countries business sector on a systemic level, rather on an individual basis (special conditions for large companies). The country should also work towards reducing its level of foreign debt that could once again cause political instability in the next economic downturn.

3.1.3 Innovation activities

In terms of innovation activities, Slovenia has in general been below the average of the European Union with only three out of 9 indicators that are above the indicated threshold. The country received good scores in the field of linkages (collaboration of innovative SMEs, public-private co-publications and private co-funding of public expenditures for research and development), it received an aggregated score of 105.7 in 2016. However, compared to the reference year of 2010 this score dropped from 129.0 by more than 22%, illustrating a sharp declining trend. In terms of indicators linked to status of innovators and intellectual assets, the country also received low scores with a declining trend observed across almost all included indicators.

Indicator: SMEs introducing product or process innovations

In the observed period, an average share of 30.5% of all SMEs introduced some form of product or process innovation. This is below the EUs average of 33.0 % that Slovenia almost reached in 2011 and 2012. The country trails far behind the Strong innovator benchmark (where both countries exceeded 40%), but

surpasses the average of the Danube region by more than 12%. There is a slight negative trend observed for both the EU and the Danube region.

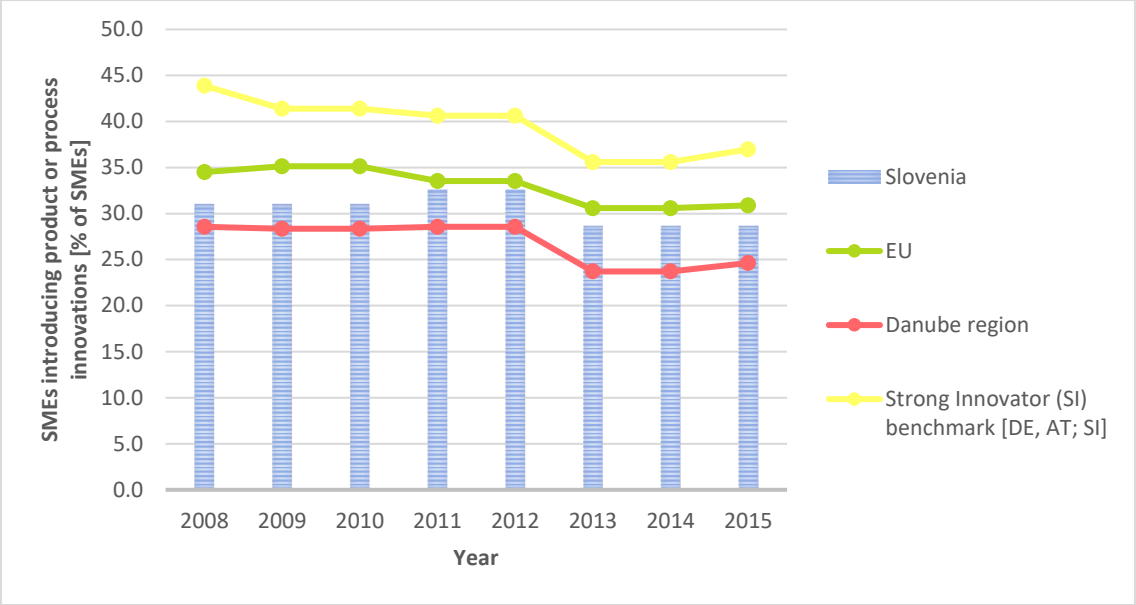


Figure 12: SMEs introducing product or process innovations as a share of all SMEs, European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

OBSTACLE: The country falls behind the EU average in terms of SMEs introducing product or process innovations. The main issue may be that the structure of the overall economy is different to that of more developed countries in terms of less value added and lower-skilled labour is comparatively more widespread, narrowing the window to introduce innovations to product or process development. Once again, we must consider the non-effective labour market that struggles to find the right personnel for their specific requirements, and even more so, fails to properly stimulate and reward the development of such innovation within the collective. The national legislation should also be adapted to reduce taxes on variable payouts for achieving company targets.

Indicator: SMEs introducing marketing or organisational innovations

In the field of SMEs that introduce marketing and organization innovations the situation is somewhat better than for those introducing product or process innovations with an average of 37.3%. However, on average, Slovenia fails to reach the average of the EU and falls well behind the SI benchmark. In addition, a negative trend is also very evident dropping from 39.4% in 2008 to 33.2% in 2015.

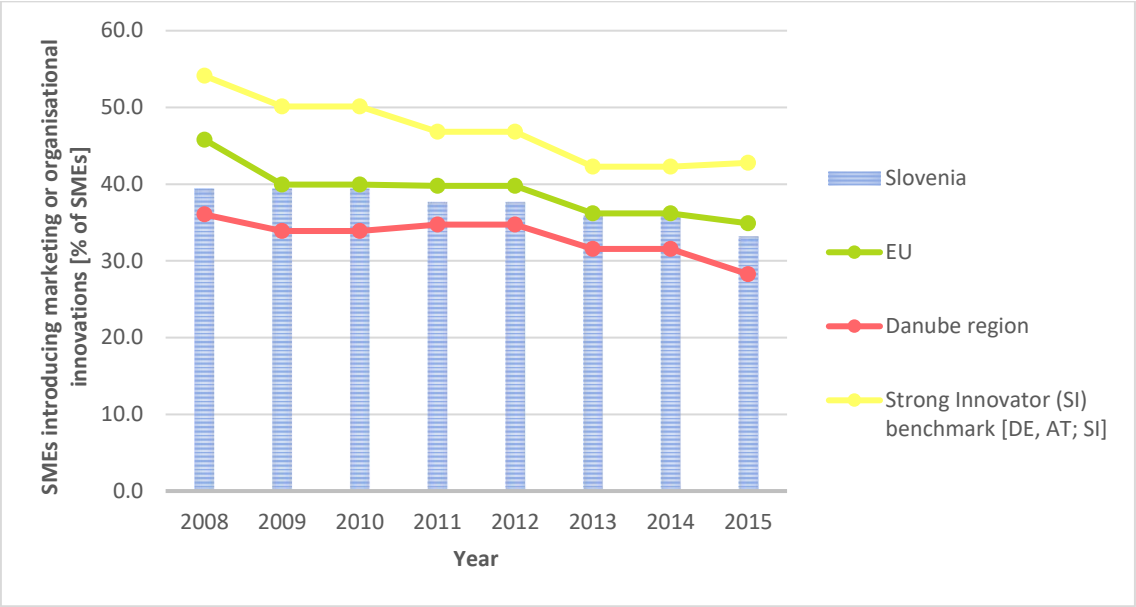


Figure 13: SMEs introducing marketing or organisational innovations as a share of all SMEs, European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

OBSTACLE: With respect to non-technological forms of innovation carried out internally at the level of SMEs, the situation is quite similar than in the case of SMEs introducing product or process innovations. Slovenia doesn`t reach the EU average and has observed a declining trend in the period (down more than 15%). As in the previous case, the main issues could do with the non-effective labour market as well as a hindering environment for monetary rewards in companies due to high taxes of employment.

Indicator: SMEs innovating in-house

On average, only a good quarter (25.8%) of SMEs in Slovenia carry out in-house innovation activities, which is comparable to the Danube region, but well below the average of the EU (30.1%) and Strong innovator countries (Austria 35.2%, Germany 42.9%). The share has remained stagnated in the observed period, while in 2015 the share of SMEs innovating in-house dropped in the EU as well as the Danube region, which Slovenia exceeded for almost 20%.

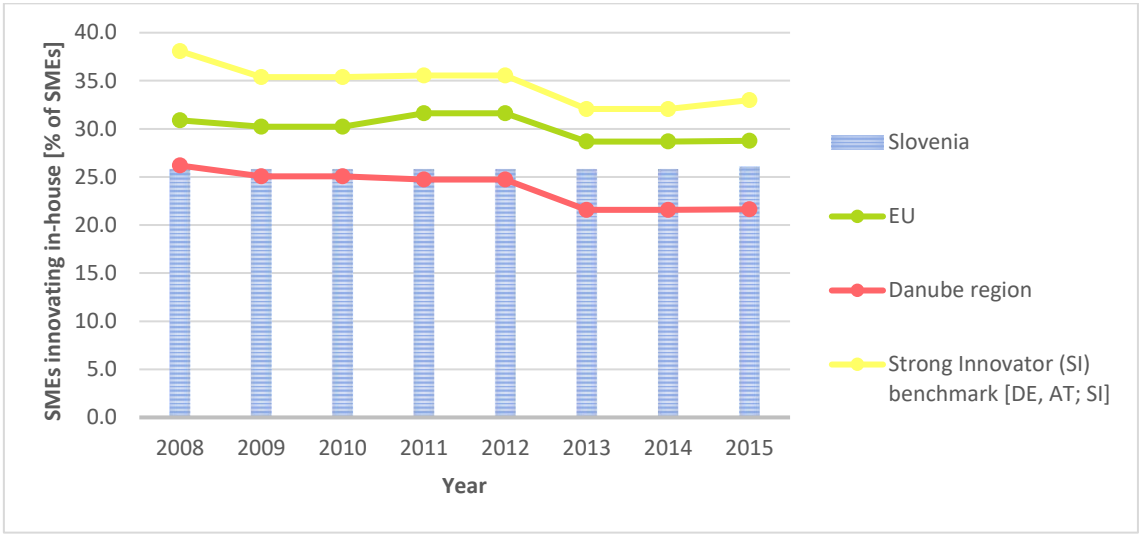


Figure 14: SMEs innovating in-house as a share of all SMEs, European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

OBSTACLE: The level of in-house innovation of SMEs in Slovenia is at a low level compared to developed countries and even the EU in general. One of the key issues contributing to the low score, besides the considerations described in previous indicators, is that SMEs often don`t have the capital to invest in developing innovations in-house or are not focused on innovation at all. A substantial share of SMEs however builds their business models specifically around developing innovation, however comparatively not to the extent of developed countries.

Indicator: Innovative SMEs collaborating with others

On average, 14.2 of Slovenian SMEs conduct innovation activities jointly with other business or different institutions and notably exceeds the average of the EU, which was 10.1% in the observed period. Slovenia on average has been only slightly lower in comparison to the SI benchmark, however Austria as the leading country had on average 17.4% of innovative SMEs collaborating with others. For Slovenia, the share decreased from 15.1 % in 2008 to 13.2 % in 2015.

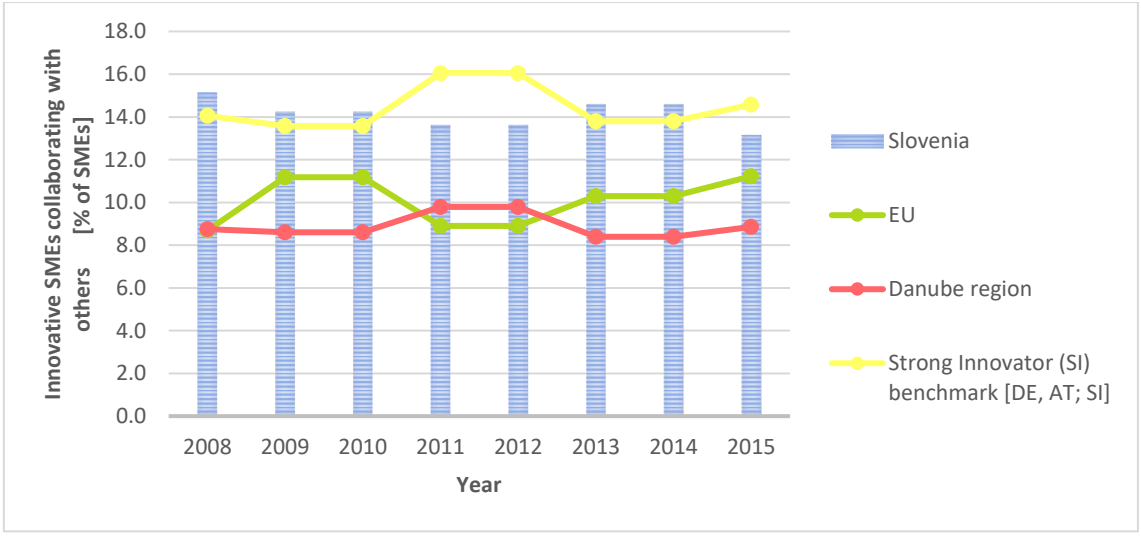


Figure 15: Innovative SMEs collaborating with others as a share of all SMEs, European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

OPPORTUNITY: Slovenia has comparatively a high share of SMEs that engage in innovation activities jointly with other companies or different institutions. Collaboration of SMEs is an important factor to overcome the intensive process of bringing a value proposition to the market, especially in the context of a very small domestic market. The relatively high share of collaborating SMEs is a clear advantage to develop innovation compared to the Danube region.

Indicator: PCT patent applications

Slovenia has had 3.03 PCT (Patent Cooperation Treaty) patent application per billion GDP in Purchasing Power Standards. The patent output of the country has been relatively constant with very little growth in the period. The average of the EU in the period was 3.82, meaning that Slovenia falls well behind when it comes to actual patents. The lag is even more evident in comparison to the SI benchmark that had an average of 5.02 from 2008 to 2015. Austria surpassed Slovenia by approximately 40% (nearly 5 patents versus 3).

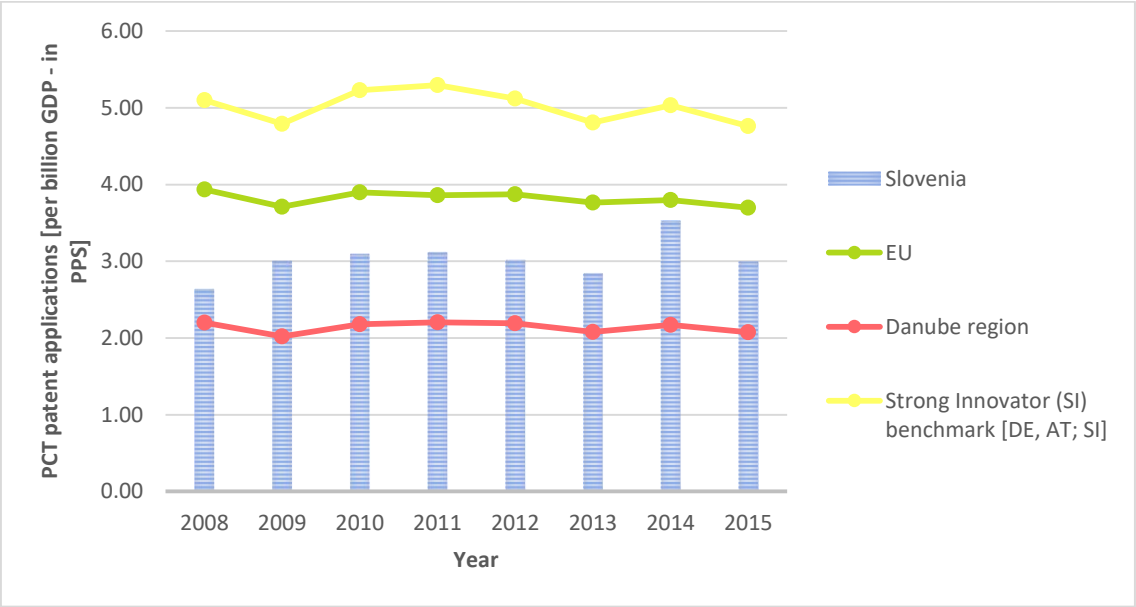


Figure 16: PCT patent applications per billion GDP (in PPS), European Innovation Scoreboard - Summary Innovation Index, 2016 (Source: European Commission)

OBSTACLE: Slovenia has had a relatively low share of PCT patent application compared to the EU and developed countries such as Austria and Germany moreover the total number has not substantially improved in the observed period. Low patent output point to inefficiencies of the innovation support system that should be properly addressed. This is also evident in the number of design application of the country in the period from 2010 onwards.

3.1.4 Impacts

The area of impacts considers the employment and sales impacts. Out of the five indicators included in the analysis, Slovenia did poorly on three. Particularly exports from knowledge-intensive services and employment in fast-growing enterprise have been far below the average of the EU, while sales of new-to-market/firm innovations where scored very highly.

Indicator: Employment in Knowledge Intensive Activities (KIA) and medium/high-tech manufacturing

In Slovenia, employment in knowledge intensive activities in both manufacturing and services is below the EU average and point to an inconsistency with the share of scientists and engineers as % of active population.

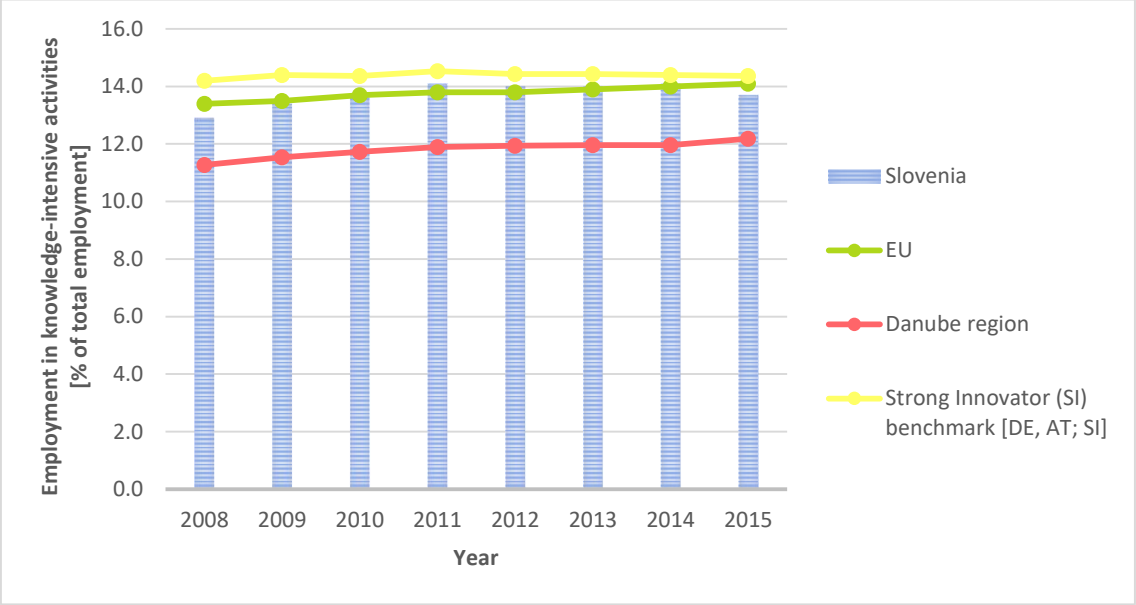


Figure 17: Employment in Knowledge Intensive Activities (KIA) as a share of total employment, European Innovation Scoreboard Summary Innovation Index, 2016 (Source: European Commission)

Employment in medium-high and high-tech manufacturing as a share of total employment in Slovenia is also well below the European Union, on average 24%.

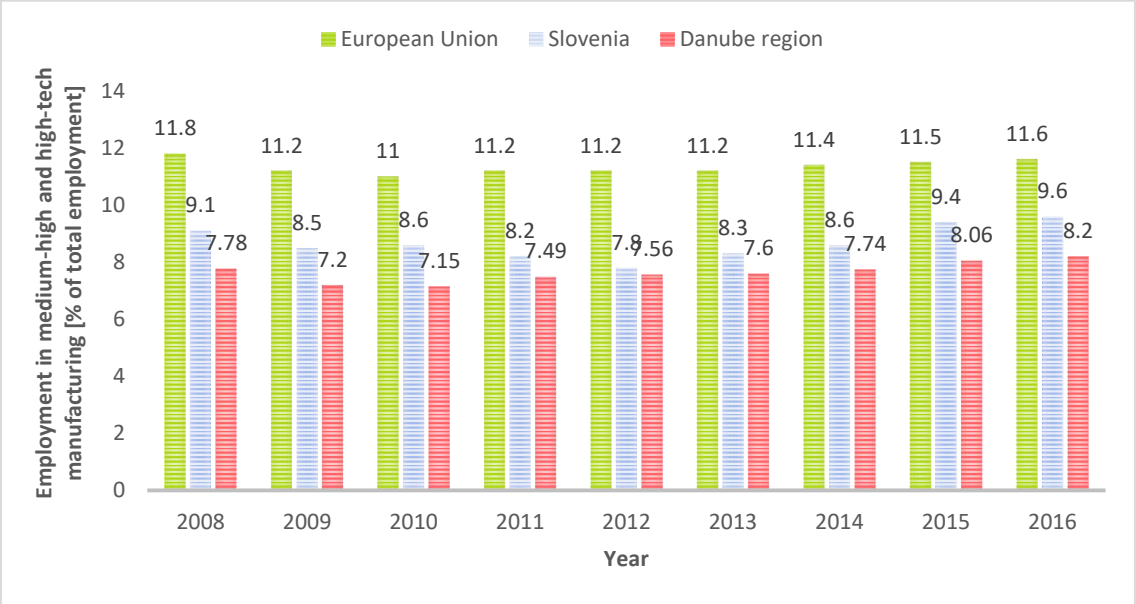


Figure 18: Employment in medium-high and high-tech manufacturing as share in total employment, Innovation Output Indicator, 2016 (Source: European Commission)

OBSTACLE: The low level of employment in knowledge intensive activities in both manufacturing and

services as well as the low share of employment in medium-high and high-tech manufacturing (as a share of total national employment) is comparably low to that of the EU. This presents a clear obstacle in the future development of eco-innovative products and services on the country level.

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

On average 55.5% of all products exported from Slovenia have been represented by medium and high technology products, which is better than the average of the European Union (54.3%). The country's economy is highly dependent on international trade. The ratio of merchandise trade compared to GDP is one of the highest in the region. Export and imports in 2016 represented 77.8% and 68.5% GDP respectively. The maximum share of exports of medium and high technology products was reached in 2009 and then steadily declined until 2012, where is stabilized with sluggish growth towards 2015.

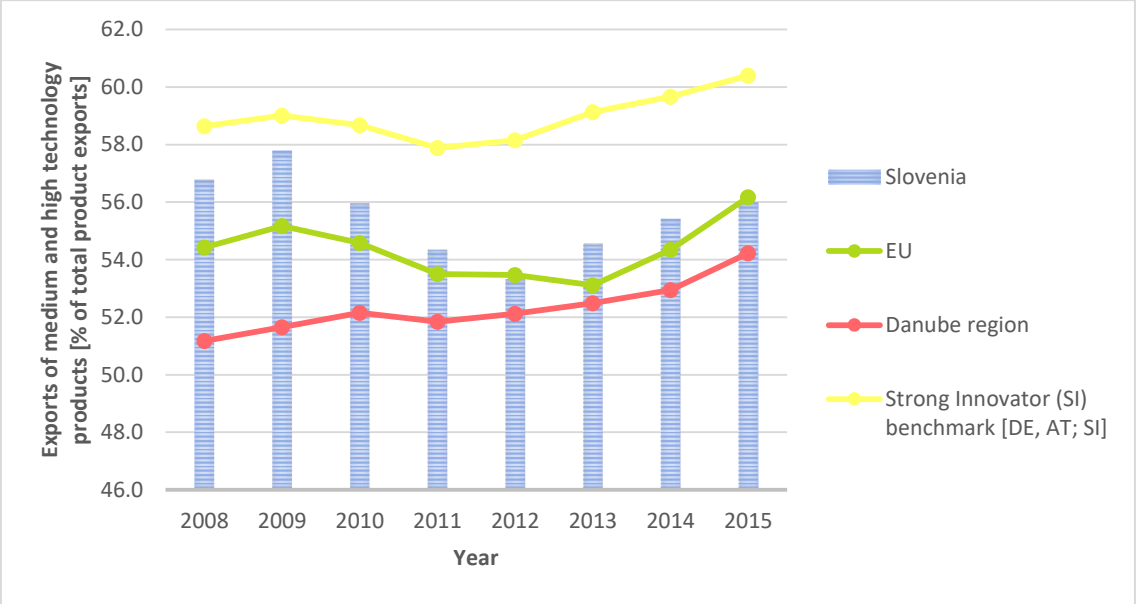


Figure 19: Exports of medium and high technology products as a share of total product exports, European Innovation Scoreboard Summary Innovation Index, 2016 (Source: European Commission)

OBSTACLE: Slovenia has a good share of medium and high technology exports, however it has still not reached the level of developed countries. The divided between Slovenia and the SI benchmark has grown from 3% to almost 8% in the time-period, where the country has also fell behind the average of the EU. The country should provide additional incentives and support mechanisms for export-oriented companies of high technology products, particularly in the field of the simplification of the administrative framework and the optimization of the progressive tax scale for high-skilled personnel.

Indicator: Knowledge-intensive services exports

Slovenia has a very low share of knowledge-intensive services exports measured as a percentage of total services exports. On average only 34 % of all services exports represented knowledge-intensive services, compared to the EU average, which was 67.7% in the observed period. In 2015, only Croatia (with a share of

19.0%) had a lower share than Slovenia, while all other observed countries from the Danube region had higher shares of such services exports.

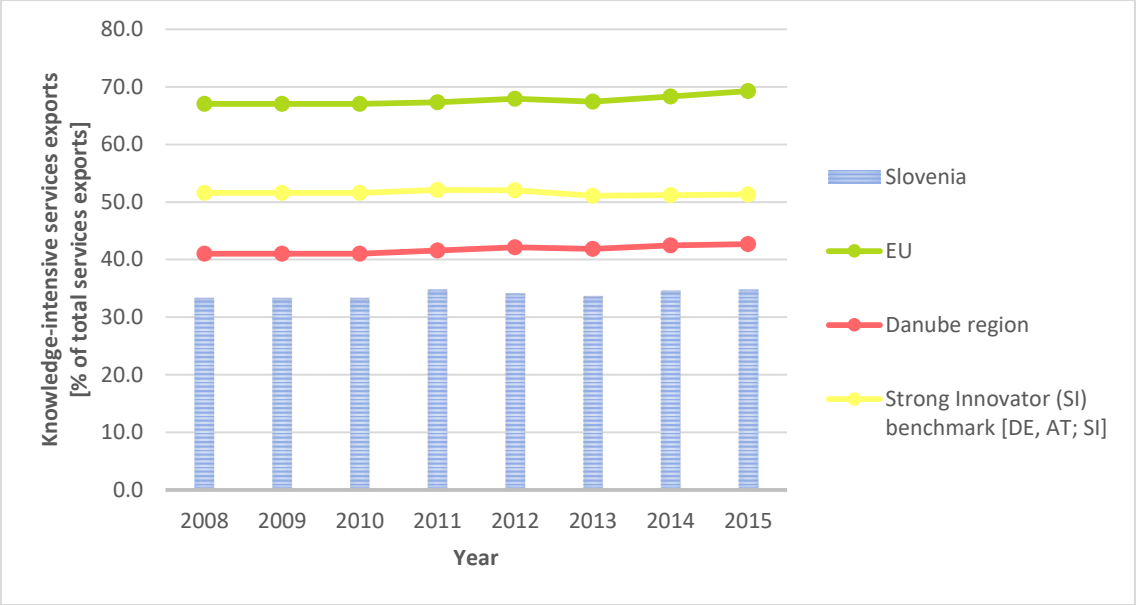


Figure 20: Knowledge-intensive services exports as percentage of total services exports, European Innovation Scoreboard Summary Innovation Index, 2016 (Source: European Commission)

OBSTACLE: Slovenia has a very low share of knowledge-intensive services exports even compared to the average of the Danube region and should consider improving conditions for the support of such exports.

Indicator: Sales of new-to-market and new-to-firm innovations

On average only 12.6% of the total enterprise turnover in Slovenia is a result from sales of new-to-market and new-to-firm innovations, which is below the EU average of 13.0%. Slovenia reached a maximum share of 16.3% in 2009 and 2010, which declined to only 10.6% in 2011. Very sluggish growth continued toward 2015, albeit the share has still not reached pre-crisis levels from the year 2008.

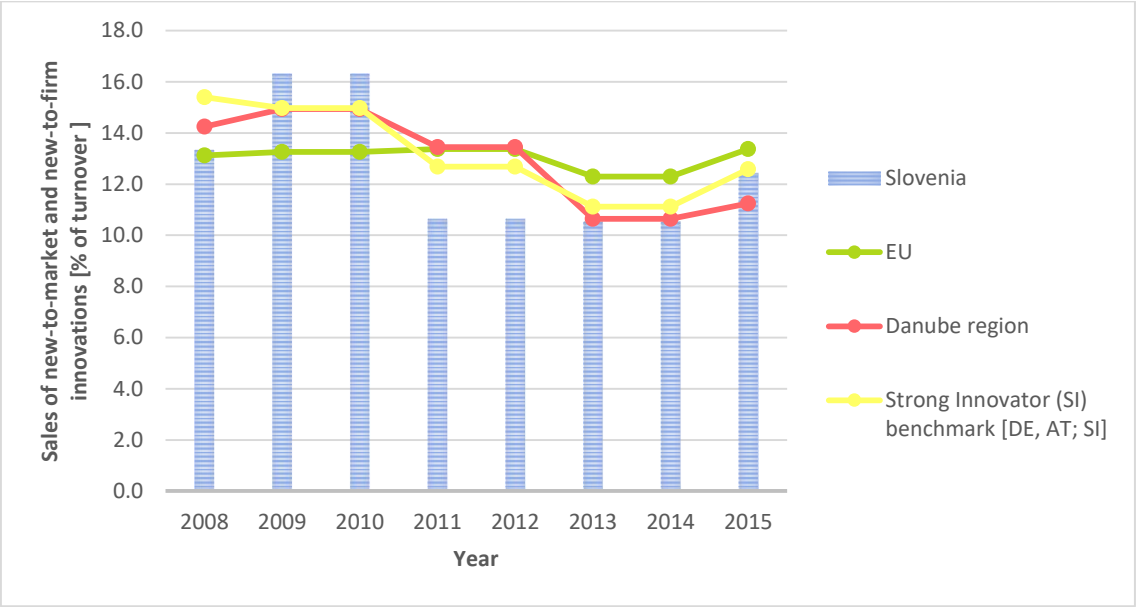


Figure 21: Sales of new-to-market and new-to-firm innovations as percentage of turnover, European Innovation Scoreboard Summary Innovation Index, 2016 (Source: European Commission)

OBSTACLE: Slovenia has a very low share of sales from new-to-market and new-to-firm innovations as a percentage of total turnover. The movement of the share is highly correlated to the delayed economic downturn caused by the financial crisis of 2008, implying that structural reforms that minimize such drastic economic shifts are required.

3.2 ECO-INNOVATION SCOREBOARD AND ECO-INNOVATION INDEX

3.2.1 Eco-Innovation Index

According to the summary index, Slovenia with a total of 104 points is second only to Germany (with 140 points) sharing the second place with equally scored Austria. Slovenia surpasses both the average of the Danube regions by a considerable margin, but only slightly with respect to the average of EU countries. It naturally falls short of reaching the SI benchmark due to the very high score of innovation leader Germany.

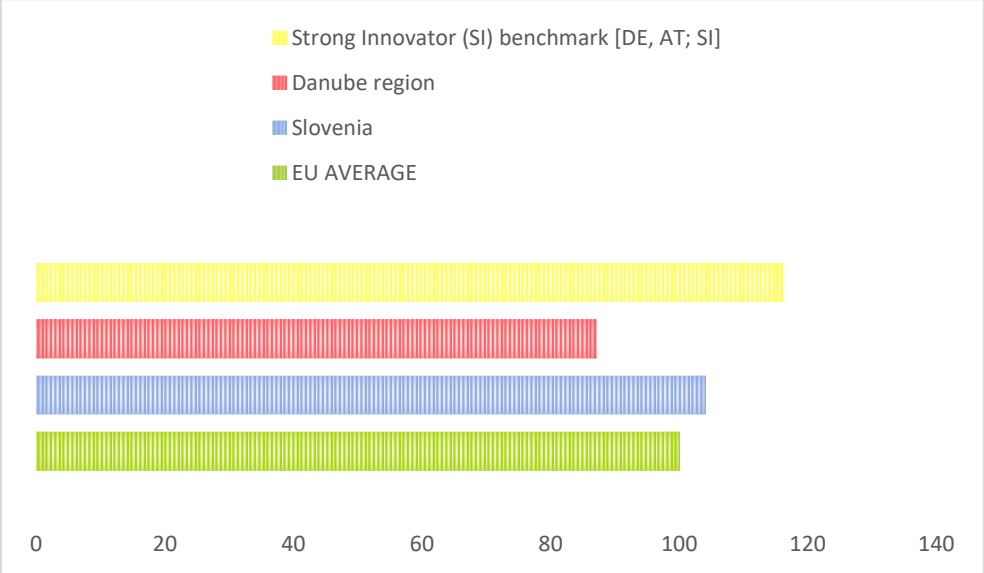


Figure 22: Eco-Innovation Index 2016, Composite Index (Source: Eco-Innovation Observatory)

Compared to 2009, when Slovenia was declared an "innovation follower" (EIS, 2009) improving its status from a "moderate innovator" in previous years, Slovenia has made significant improvements which have upgraded the countries status in terms of eco-innovation performance.
In 2010, it still lagged the average of the European Union with an eco-innovation index of 93. It surpassed the EU average in 2011 and again in 2012, when it reached an index score of 110, achieving a 115% ratio compared to the EU average, which ranked Slovenia at number 7 (number 10 in 2011) on the eco-innovation scoreboard. However, in 2013 the financial and resulting economic crisis finally began to impact the national economy, whereby large declines in export activity, turnover and employment in general weighted down on the field of socio-economic outcomes. In addition, the economic downturn also resulted in increased political instability, which also played an important role in attracting new greenfield investments that were basically non-existent in this period. Even so, material productivity doubled, personnel in research and development rose substantially, publications related to eco-innovation as well as new patents have been on the rise in the period from 2011 to 2013. In addition, reduced R&D expenditure from the government have been somewhat compensated by internal R&D expenditure of innovative companies with high value-added, mostly from the fields of the automotive industry and mobility, electrical equipment and appliances, energy efficiency in buildings and sustainable construction. By 2014, the situation already drastically improved with the country almost reaching the EU average and index score parity with Austria at 98, where it stayed also in 2015. In 2016, Slovenia along with Austria was ranked as the 8th on the scoreboard at 104 points.

3.2.2 Eco-innovation inputs

In terms of the aggregated index of **eco-innovation inputs**, the divide between Slovenia and the Strong Innovator benchmark becomes more evident. With an overall score of 72, Slovenia ranks (16th) well behind the average of the European countries, but is still more than 22% above the average of the Danube region.

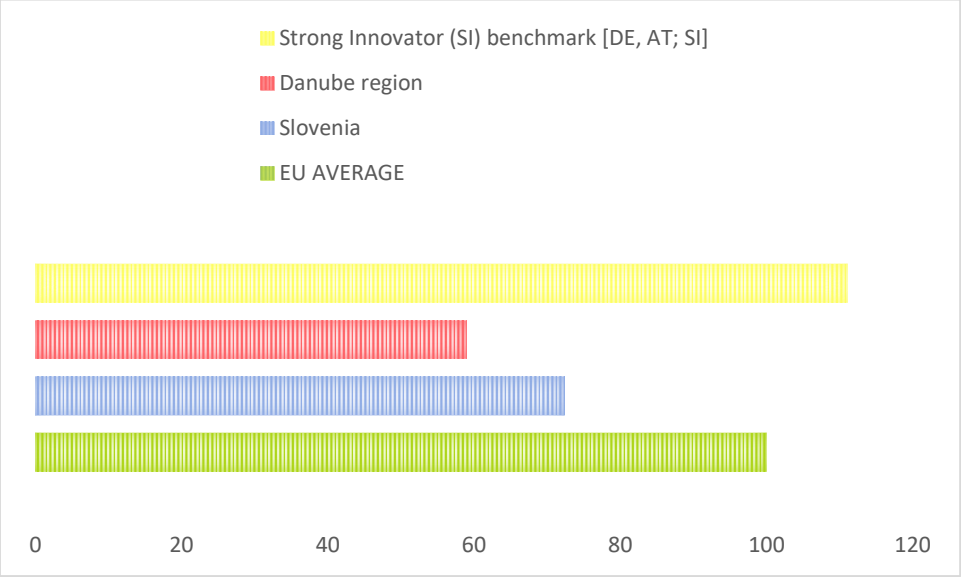


Figure 23: Eco-Innovation Index 2016, Eco-innovation inputs (Source: Eco-Innovation Observatory)

The most negative impact is the total value of green early stage investments per capita, where Slovenia along with Slovakia, Romania, Malta, Bulgaria and Greece had no notable investments in 2016. Governments environmental and energy R&D appropriations and outlays as a share of the national GDP is also notably well below the average of the EU countries with a score of 75. The most favourable indicator included in this index is the total R&D personnel and researchers, where Slovenia is ranked at number 9 with and overall score of 128.

3.2.3 Eco-innovation activities

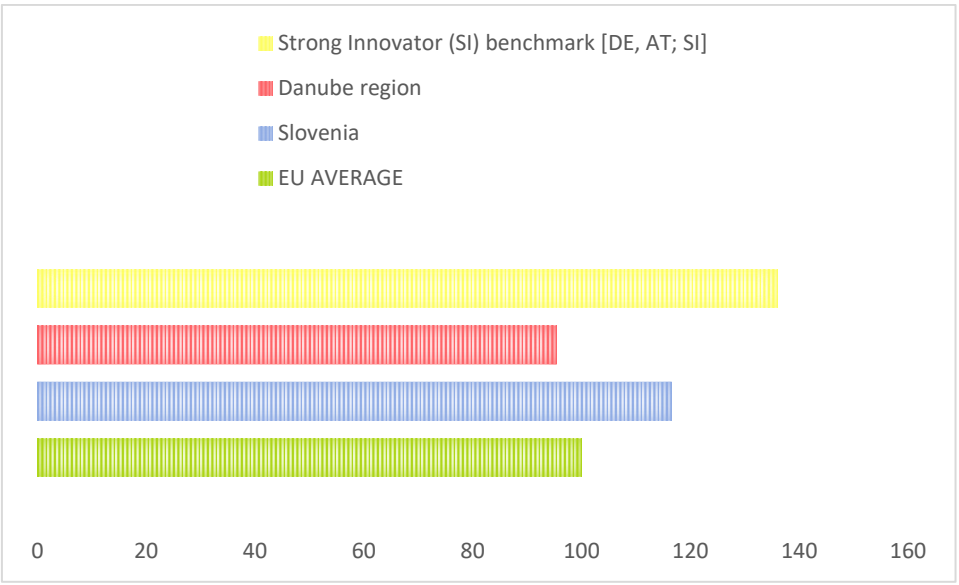


Figure 24: Eco-Innovation Index 2016, Eco-innovation activities (Source: Eco-Innovation Observatory)

Slovenia ranked 8th with a score of 116, which is notably better than the EU average and about 22% above the average od the Danube region. The country did very well across all indicators except for the organizations registered with ISO 14001 environmental management standard per million population, where it received a score of only 71, putting it behind most of the Danube region countries except for Austria and Germany. In terms of enterprises that have introduced/implemented innovation activities aiming at a reduction of material input per unit output as a share of the total number of enterprises, Slovenia once again exceeded the average of EU countries and with a score of 113 ranked 6th behind Germany, Austria, Portugal, Finland and Luxembourg. With respect to enterprises declaring to have implemented innovation activities aiming at a reduction of energy input per unit output, Slovenia ranked 7 with an overall score of 148.

3.2.4 Eco-innovation outputs

The component of Eco-innovation outputs, which measures the extent to which knowledge outputs generated by businesses and researchers relate to eco-innovation, is the most favourable area where Slovenia has some advantages, even in comparison to the Strong innovator benchmark.

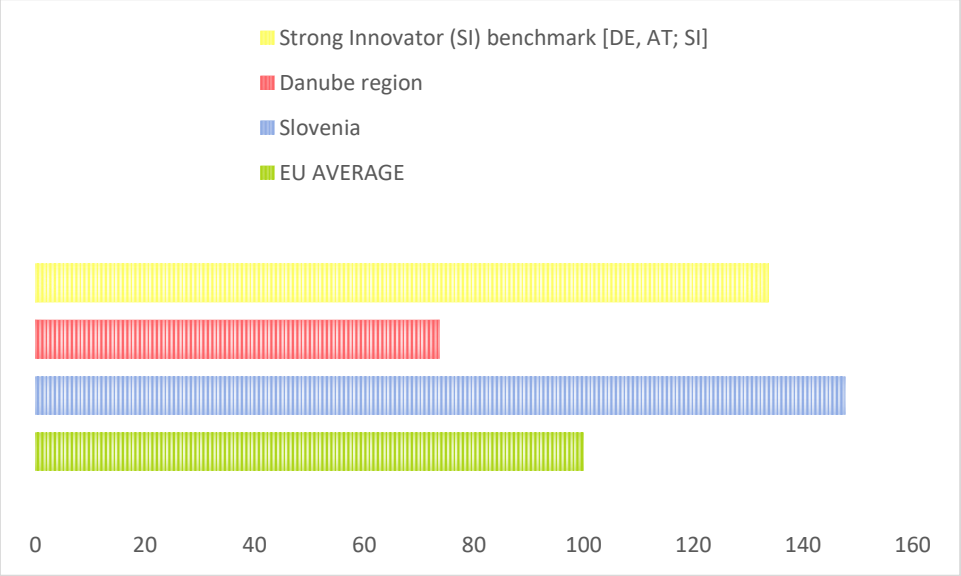


Figure 25: Eco-Innovation Index 2016, Eco-innovation outputs (Source: Eco-Innovation Observatory)

With a score of 148, Slovenia is ranked 6th surpassing all countries from the Danube region, even Germany by 7 points. Slovenia had outstanding results in the area of eco-innovation related academic publications per million inhabitants where it ranked 9th with a score of 145 and even more so in the area of media coverage per numbers of electronic media related to Eco-innovation, where it received a total score of 210. Nevertheless, a closer inspection of the separate indicators show that Slovenia only barely outperformed the EU average in the field of actual patents per million inhabitants related to eco-innovation.

3.2.5 Resource efficiency outcomes

In terms of resource efficiency outcomes, which relate to wider impacts of eco-innovation on resource productivity (increase generated economic value and decrease negative environmental impacts) and essentially display how a country is successful in decoupling resource use and economic growth, Slovenia is doing poorly. With an overall score of 85 it trails both the averages of the countries within the Danube region

(94) and even more notably the average of the EU. Compared to the Strong innovator benchmark there is a difference of more than 11%.

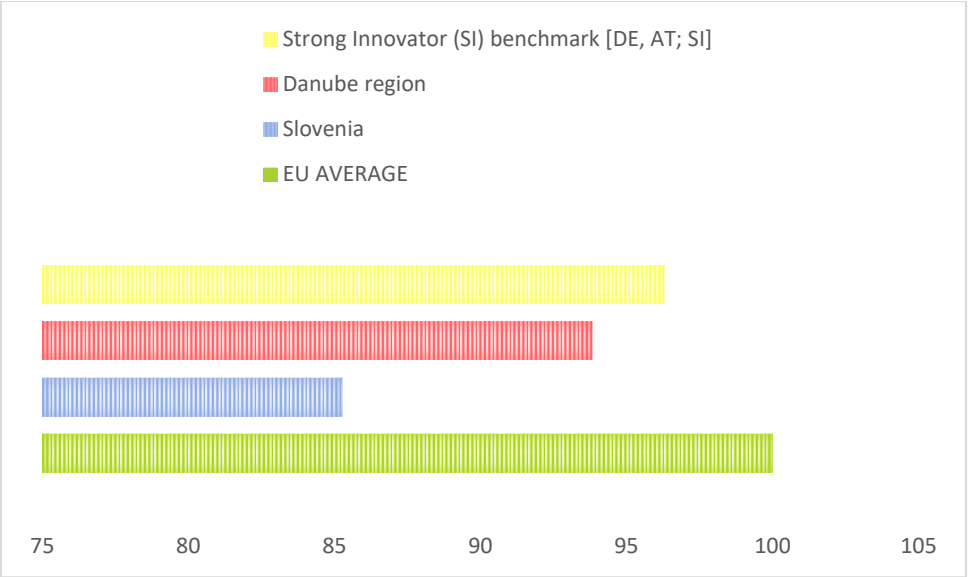


Figure 26: Eco-Innovation Index 2016, Resource efficiency outcomes (Source: Eco-Innovation Observatory)

However, it should be noted that the midterm trend observed in the period from 2010 to 2016 shows that Slovenia has indeed make notable improvements whereby in 2010 the average score was 71 and the country ranked 23rd on the scoreboard. In 2016, a score of 85 was obtained, ranking the country two spots higher just below France and Austria. The main challenge that the country is facing still in 2016 is low energy productivity that is measured as the national GDP divided by gross inland energy consumption. For this indicator Slovenia received a very low score of 57, surpassing only the Czech Republic, Finland, Bulgaria and Estonia on the bottom of the scoreboard.

More worrisome is still the fact that much better results were documented in the years prior to 2013 (achieving the best score 73 in 2012), which point to an unfavourable medium-term trend and shows that decoupling economic growth and energy use has been unsuccessful despite 100 of millions of EUR in RES subsidies. With regard to the material productivity measured as GDP divided by total domestic material consumption, Slovenia has also been lagging behind the EU average with a score of 78, but has surprisingly been more successful than all countries from the Danube region except Germany, surpassing even Austria, which is ranked three placed lower. Considering that the country was ranked towards the bottom of the scoreboard in 2010, the medium-term trend seems positive, although the ranking was better in the years 2014 and 2015, when the country almost reached the EU average.

With reference to the indicator of water productivity, which is measured as the quotient of the national GDP and the water footprint, Slovenia is ranked well below the EU average with the score of 63 and is also surpassed by many countries from the Danube region, Including Slovakia, the Czech Republic, Croatia and Germany. The score has remained more or less constant in the period from 2010, but the countries rank has deteriorated substantially. For 2016, there is no data available for some countries that have traditionally surpassed Slovenia (such as Austria).

Regarding GHG emission intensity, Slovenia ranked favourably well above the EU average in 9th place with a score of 138, surpassing both Germany and Austria by a considerable margin. This indicator measures emissions of CO2 equivalents compared to the national GDP.

3.2.6 Socio-economic outcomes

Regarding **socio-economic outcomes**, Slovenia generally does very well and considering the aggregated index for 2016 with a score of 119 was ranked 8th. It closely trails Germany (129) and exceed the score of Austria by a large margin, therefore in also exceeds the Strong innovator benchmark. However, except 2013, Slovenia was traditionally amongst the top 2 countries on the scoreboard in the period from 2010 to 2016, and has therefore comparably lost some ground to other countries in the EU as well as the Danube region.

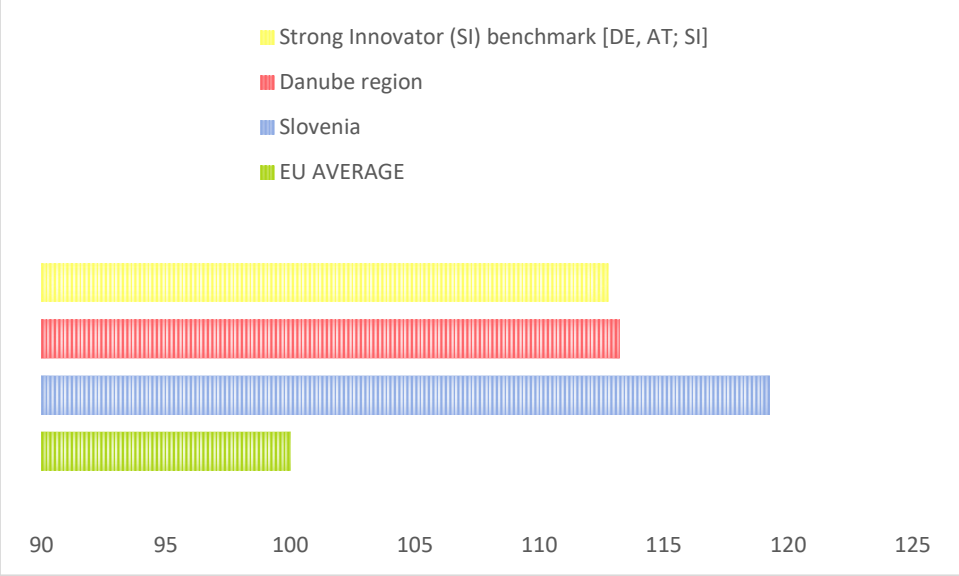


Figure 27: Eco-Innovation Index 2016, Socio-economic outcomes (Source: Eco-Innovation Observatory)

Slovenia ranks poorly in the area of exports of products from eco-industries as a share of total exports, where it only reached a score of 78 in 2016. The country does however do very well in terms of employment in eco-industries and the circular economy measure as a share of total employment across all companies.
As is the case with the aggregated index, the country has severally declined on the scoreboard, a top score of 282 was reached in the years 2010-2012, compared to 2016 when it reached only 147. The final index illustrates the revenue in eco-industries and circular economy as a share of total revenue across all companies. It shows that the country is doing well in terms of actual turnover in such industries with a score of 165 in 2016.

3.3 THE INNOVATION OUTPUT INDICATOR (IOI)

Indicator: Innovation Output Indicator (composite)

Slovenia has comparably a similar value of the composite indicator focused on innovation output to that of the average of the countries in the Danube region. Compared to developed countries such as Austria and Germany, the indicator is on average 14% and 28% less in the observed time period respectively. Furthermore, the indicator value for Austria grew more than 9% from 2011 to 2014, while for Slovenia it rose less than 2%.

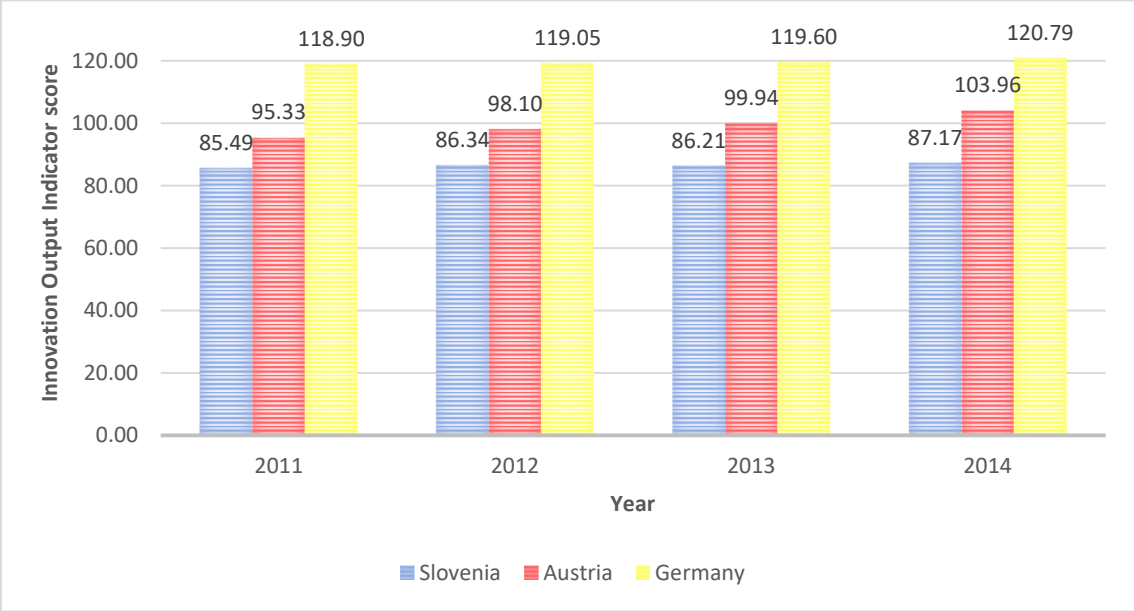


Figure 28: Innovation Output Indicator, 2011-2014, (Source: Research and Innovation Observatory, European Commission)

OBSTACLE: The composite indicator illustrates that the output from innovation in Slovenia is very low compared to developed countries. The low level of employment in knowledge intensive activities in both manufacturing and services as well as the low share of employment in medium-high and high-tech manufacturing (as a share of total national employment) is comparably low to that of the EU, which is a clear obstacle in the future development of eco-innovative products and services on the country level.

OPPORTUNITY: Highly educated persons in the field of engineering and science present a high share of the population active in the national workforce. This indicates that Slovenia is well represented in the highest fields of knowledge, technical development and specialization. This presents a clear opportunity within a context that Slovenia will be become a highly developed country that can compete in the world economy with expertise and special skills. This opportunity can be capitalized upon by providing better conditions for scientist and researchers on the national level in order to stop/limit immigration and brain drain.

Indicator: Scientists and engineers as % of active population

The share of scientists and engineers within the Slovenian total population has increased by nearly 62% in nine years, reaching a very high 7,6% in 2016. The national growth followed the trend of countries in the

European Union until 2015, when it was surpassed it by 12%. Compared to the average of countries in the Danube region, Slovenia has 26% more of scientist and engineers as a share of active population, and is in this regards the leading country (also slightly surpassing Germany in 2016).

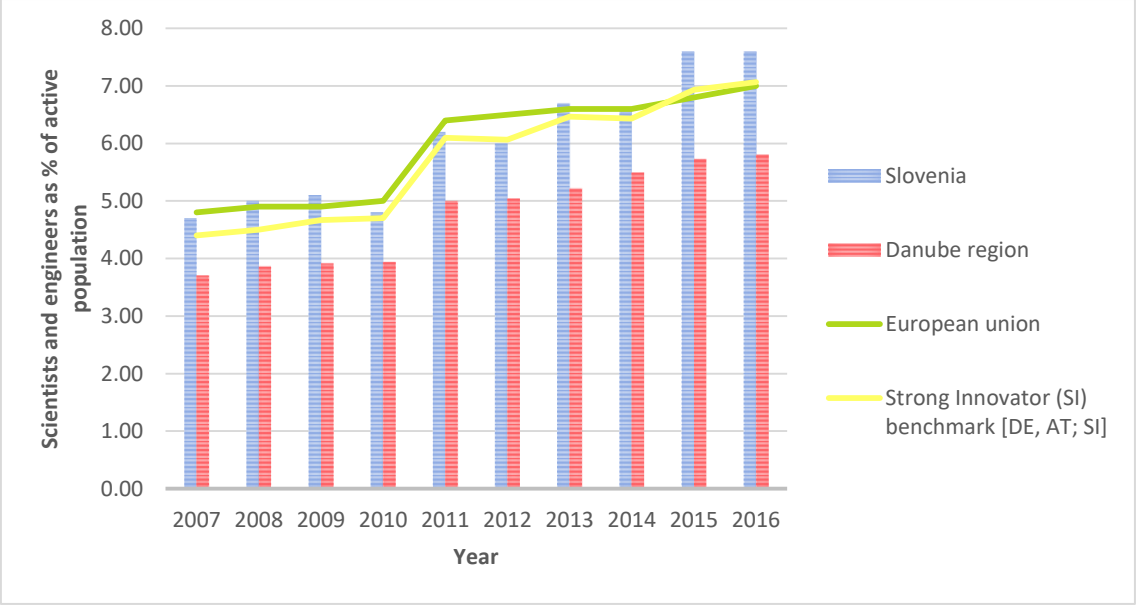


Figure 29: Scientists and engineers as % of active population in Slovenia (Source: Eurostat)

OPPORTUNITY: Highly educated persons in the field of engineering and science present a high share of the population active in the national workforce. This indicates that Slovenia is well represented in the highest fields of knowledge, technical development and specialization. This presents a clear opportunity within a context that Slovenia will be become a highly developed country that can compete in the world economy with expertise and special skills. This opportunity can be capitalized upon by providing better conditions for scientist and researchers on the national level in order to stop/limit immigration and brain drain.

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

The amount of total intramural R&D expenditure (GERD – Gross domestic expenditure on R&D) from all sectors (inclusive of funding from business enterprise sector, government sector, higher education sector and 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).
Slovenia in 2009 was slightly below the average of the European Union, which was then followed by substantial growth of the share to 2.60% in 2013, after which the trend turned negative and converged closely to the EUs reference at 2.21% in 2015.

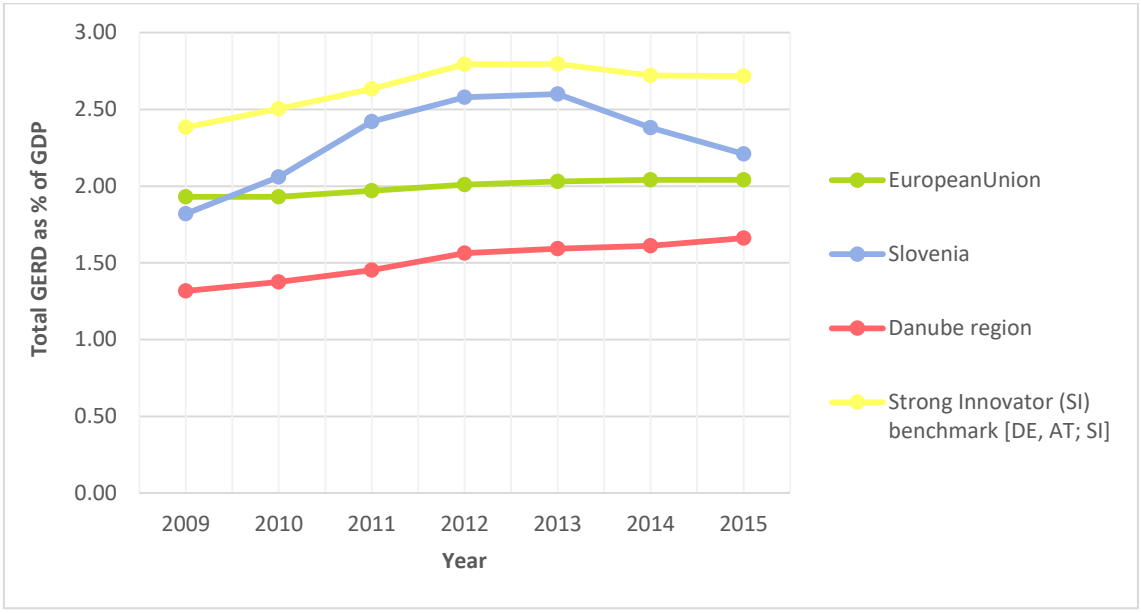


Figure 30: Total Intramural R&D expenditure as % of GDP - all sectors (Source: Eurostat)

With regard to the R&D expenditure of the business sector, in absolute terms Slovenia is falling behind even compared to the Danube regions average excluding Germany and Austria, on average by more than 10%. The graphical representation of the Danube regions as a whole was excluded due to the large size of the German expenditure – also on the level of states Baden Wuertenberg and Bavaria).

The values in absolute terms have continue to diverge in 2015, in which the difference was already 27% (853,1 million compared to more than 1,16 billion in 2015). Within the observed period, the average total intramural R&D expenditure in countries of the European Union was 530 € per capita and 342 € (-35%) in countries of the Danube region. Expenditure of Slovenia changed within the range of 323 to 454 € (in 2013) and reached a level of 413 € in 2015. The average expenditure was 410 € (approximately 20% above the average of countries in the Danube region).

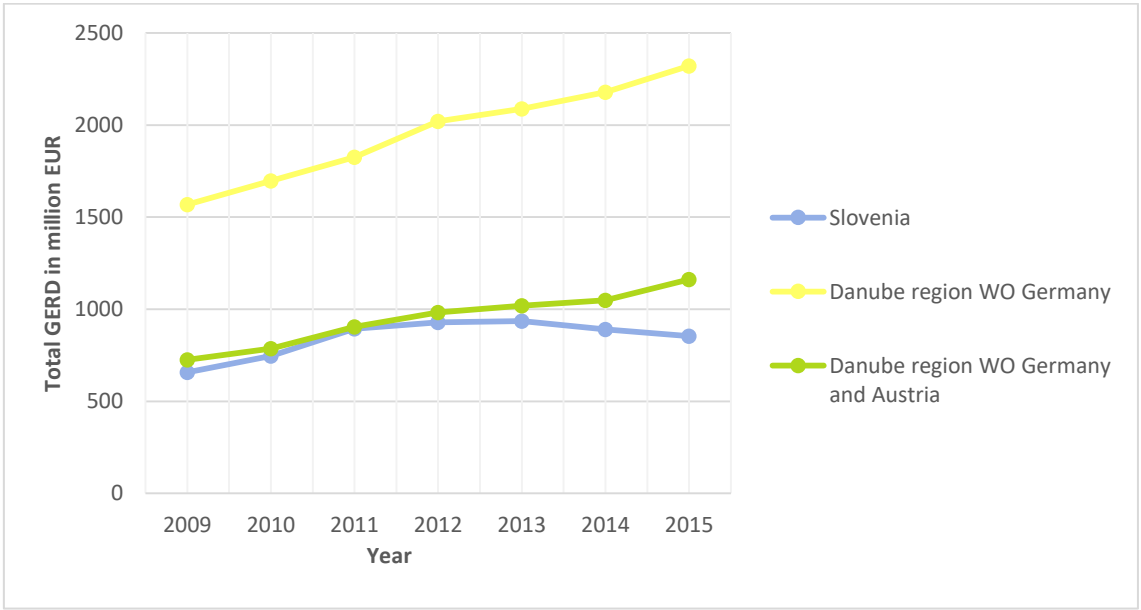


Figure 31: Total Intramural R&D expenditure in million EUR - all sectors (Source: Eurostat)

OBSTACLE: Total Intramural R&D expenditure is too low. Total Intramural R&D expenditure per capita in Slovenia was only 77% of that of the European Unions average and was less than half of the average for comparable developed countries (only 38% of the expenditure in Austria and 43% of the expenditure in Germany). There is a clear lack of intramural expenditure for R&D across all sectors, which can be seen as an obstacle of further development of Eco-innovations.

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

The indicator of R&D expenditure within the private sector as a share of national GDP is inclusive of the business sector (BES) as well as the private non-profit (PNP) sector. This indicator is could also be titled Business enterprise R&D expenditure (BERD) financed by all sectors (including business enterprise, higher education, private non-profit, government and foreign).
Slovenia surpassed the European Unions average, which has remained stable within the observed time period, in 2009 and continues to exceed in 2015, although the trend has reversed in 2013, when the maximum share of national GDP (2%) was allocated to private expenditure in R&D. This value has to be observed from the perspective that the Slovenian GDP lost almost twice as much as the average EU member state in 2009.
The private sector from countries within the Danube region have on average allocated a slightly larger share of the national GDP to R&D expenditure, which can be observed as a modest linear trend in the observed period.

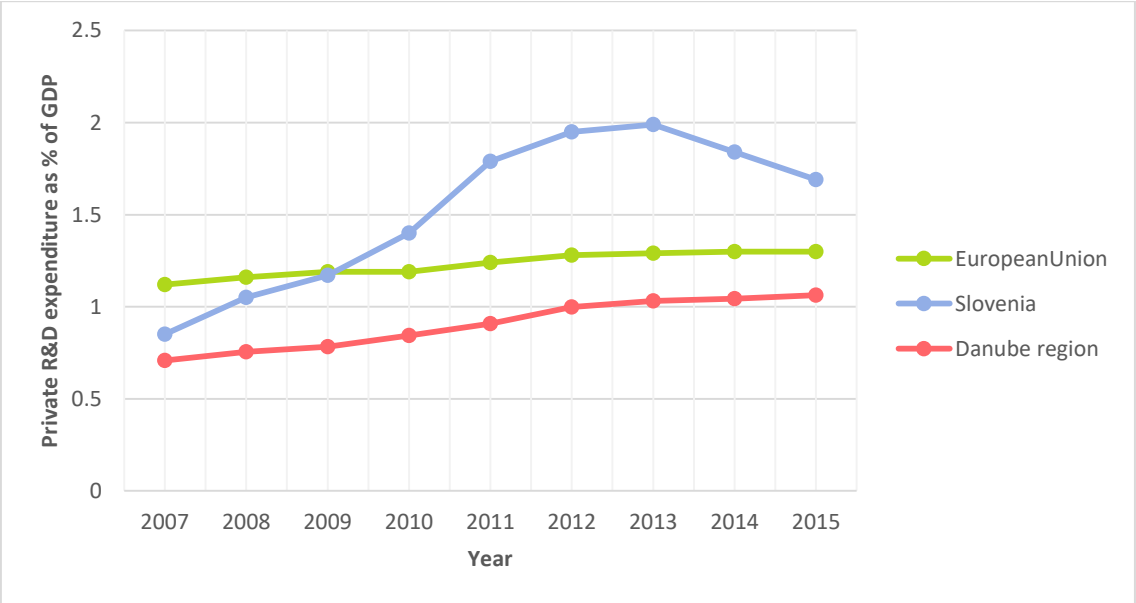


Figure 32: R&D expenditure of the private sector as % of GDP (Source: Eurostat)

OPORTUNITY: Slovenia`s private sector has on average been investing more into research and development, which has been and can be further capitalized upon with increased competitiveness, increased know-how and additional marketable value propositions.

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

Slovenia has substantially increased the BERD expenditure (all sectors) in absolute terms to almost 240% of the initial expenditure in 2007 (299 million EUR) to 715 million EUR in 2013. In 2015 BERD expenditure reached 650 million (more than an 117% increase compared to the reference value in 2007). The most notable growth was documented from 2009 until 2011 despite the negative trends of the national economy. The indicator includes funding from the business enterprise sector, the government sector, the higher education sector, the private non-profit sector as well as contributions from abroad.

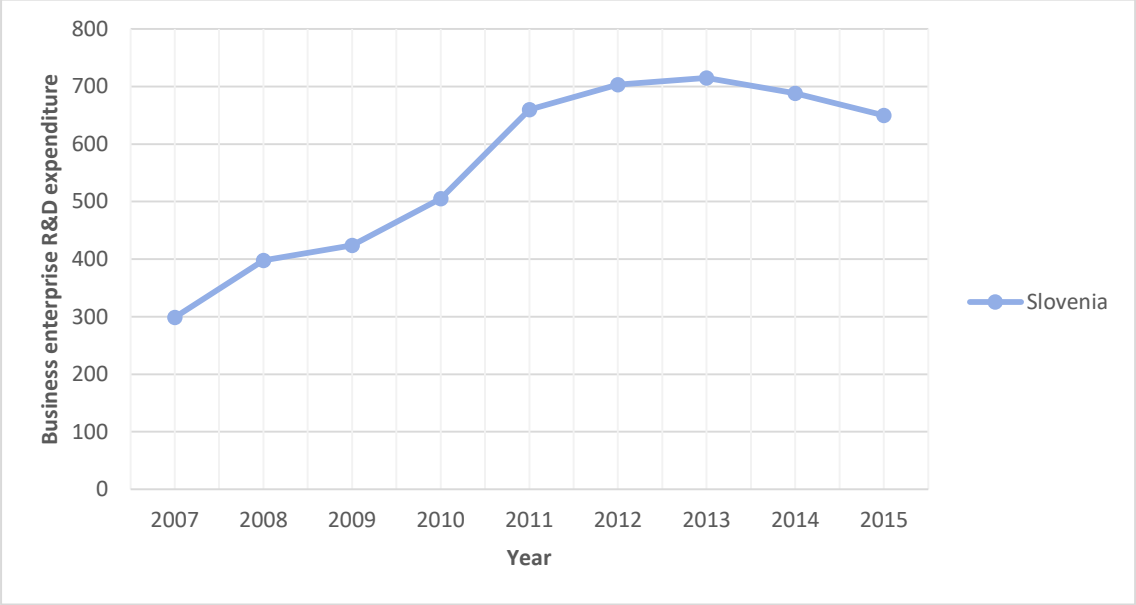


Figure 33: Business enterprise by all sectors (Source: Eurostat)

OPORTUNITY: Total BERD expenditure has substantially increased within the observed period. Further boost to BERD expenditure would provide additional opportunities for product/service development and knowledge sharing.

Indicator: Business enterprise R&D expenditure financed by public funding as % of GDP

Business enterprise R&D expenditure (BERD) includes financing through public funds (by the government) but disregards other sources of public funds such as from higher education and EU funding. Slovenia has exceeded the averages of both the European Union and countries within the Danube region (which follow comparable values and patterns) from the end of the first quarter of 2008, but has declined below the EU average to that of the Danube region in 2015. Business expenditure in R&D in terms of GDP share has peaked in 2011 to 0.27% and has been on a substantial decline ever since. It`s important to note that real GDP growth in Slovenia notably exceeded the EU average in 2015.

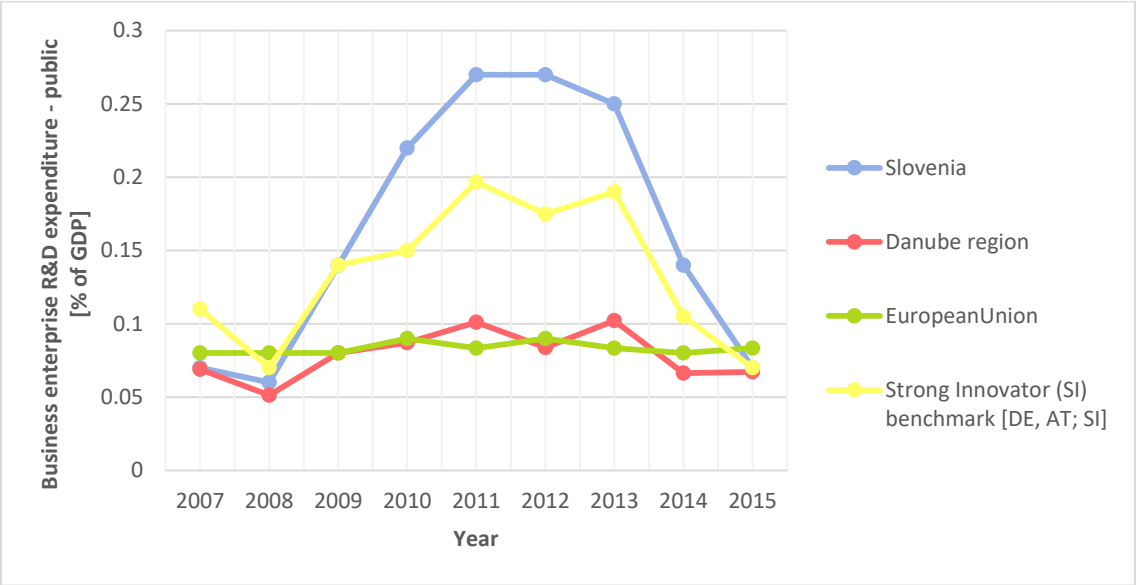


Figure 34: Business enterprise expenditure as % of GDP (Source: Eurostat)

OBSTACLE: Public funding of Business expenditure in research and development is comparably low (similarly to the total public expenditure on R&D with reference to national GDP), which is seen as a clear obstacle hampering the support of eco-innovation.

Indicator: Government budget appropriations or outlays for R&D

The amount of government budget appropriations or outlays for R&D as a share of general governmental expenditure in countries within the Danube region is notably lower than that of the European Union, on average about 20%. In 2007 this amounted to 25.5%, however, with a slight decrease within countries of the EU and a substantial increase of budget appropriations and outlays in the Danube region (+10% from 2007 to 2016), the trend has converged to achieve the smallest difference in 2016 (less than 15%). Slovenia in 2007 secured 1.22% of general budget expenditure to R&D and also increased the spending to a peak value of 1.40% in 2009. This was followed by several years of a significant negative trend, thus the share of government appropriations and outlays reached a record low in 2013 with only 0,81% (more than a 42% decrease from the highest value and a 25% decrease from the average). The trend has been somewhat positive from 2013 onwards, however in 2016, the share achieved only slightly more than 77% of the Danube regions average, and just 66% to that of the European Union.

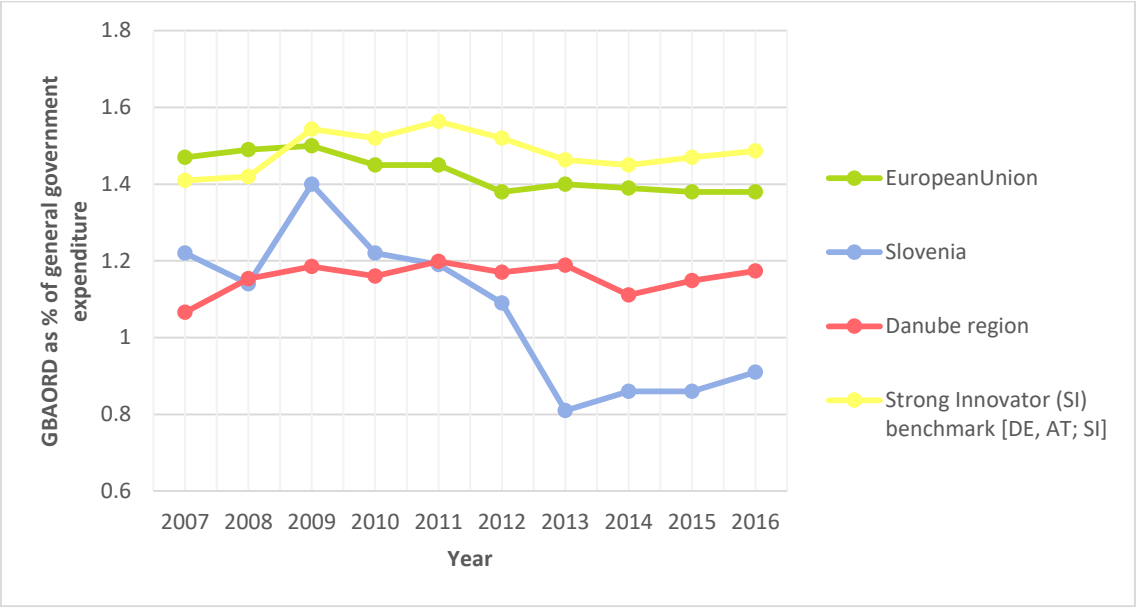


Figure 35: Government budget appropriations or outlays for R&D (Source: Eurostat)

OBSTACLE: Government budget appropriations or outlays for R&D as is the case in general for public funding in Slovenia, has not lagged far behind the EUs and Danube regions average. Low government budget appropriations and outlays for R&D are a major obstacle in further development and application of Eco-innovations.

Indicator: Turnover from innovation (% of total turnover)

The actual turnover from innovation as a share of total turnover has varied significantly in the observed time period (from 2004 to 2012 on a biennial basis). The average share of turnover from innovation in the European Union was 15.32% in the industry sector and 7.88% in the service sector respectively. The average is calculated with values for EU-27 including for the year 2010 with the values for EU-28 included for the year 2012. Comparably the average for countries from the Danube region have documented very similar results at 17.47% for industry and 8.7% for services. The average for Slovenia is calculated to be 7% less for industry and 8% less for services.

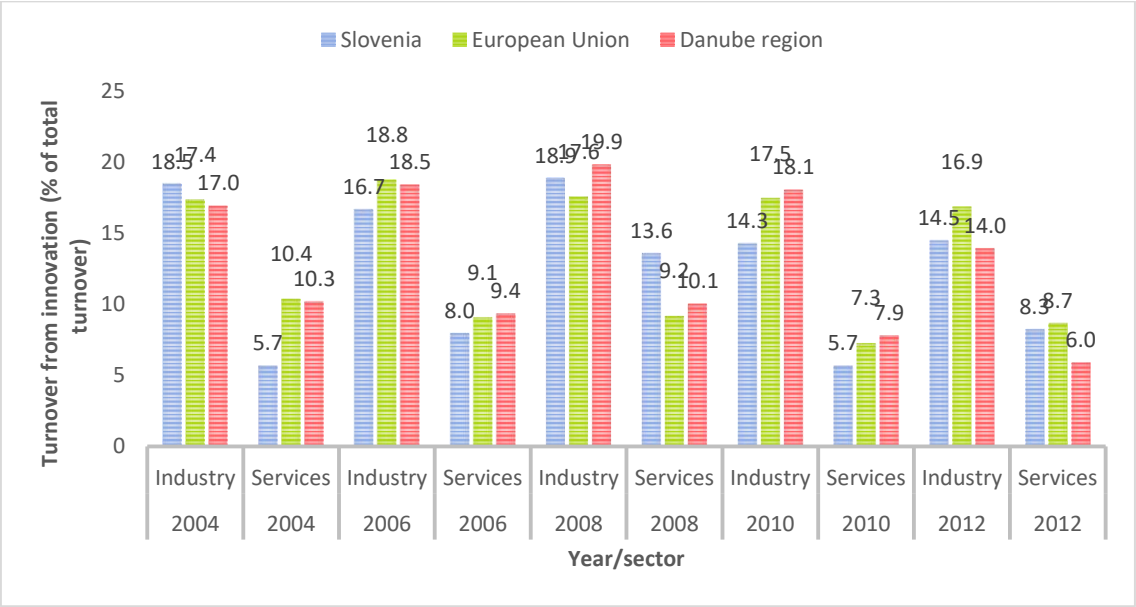


Figure 36: Turnover from innovation (% of total turnover), (Source: Eurostat)

The turnover from innovation in the industry sector in comparison to the total turnover has decreased in Slovenia from 18.5% in 2004 to 14.5% in 2012. The average share in the period from 2004 to 2012 was 16.58%, which was 6% less than the average of countries in the European Union and 5% less than countries in the Danube region respectively. Similarly, to the average of the Danube region, the share peaked in 2008 at 18.9% (19.88% in the Danube region) and was followed by a steep decline towards 2012, in which the share was only 14.5% (13.97% in the Danube region).

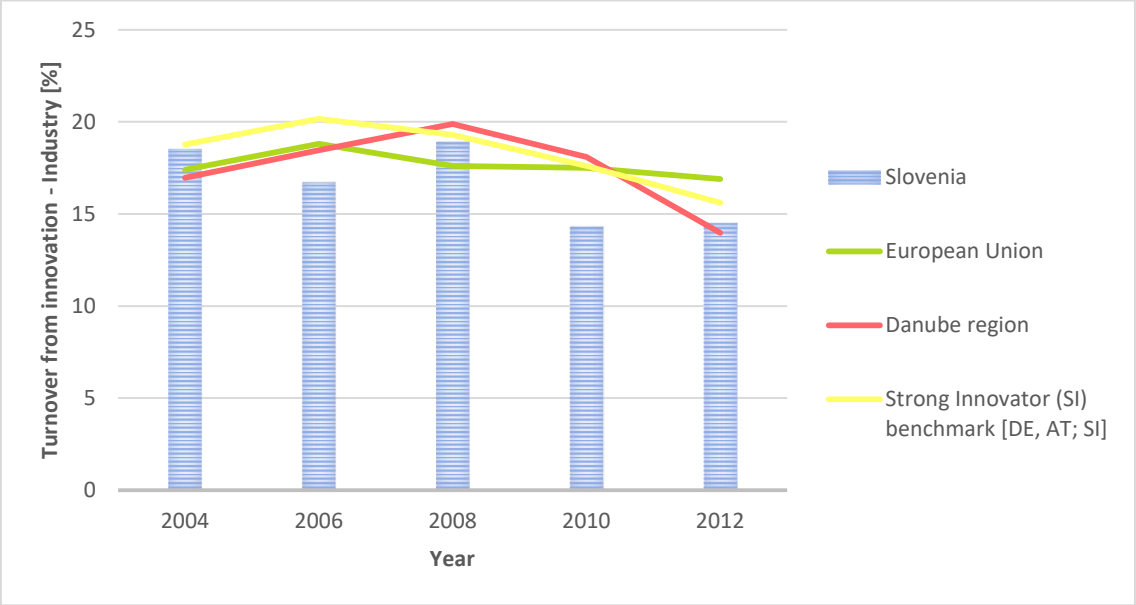


Figure 37: Turnover from innovation in industry (% of total turnover) (Source: Eurostat)

The turnover from innovation in the service sector in comparison to the total turnover has also been volatile in the observed period. Similarly, to the service sector the share reached peaked value in 2008 at 13.6%, which marked a 238% increase from 2004, when the share was only 5.7%. It was followed by a steep decline back to 5.7% in 2010 and a correction back to 8.25% in 2012. In comparison the share of analysed countries in the Danube region has been on almost a steady decline from 10.25% in 2004 to only 5.95% in 2012.

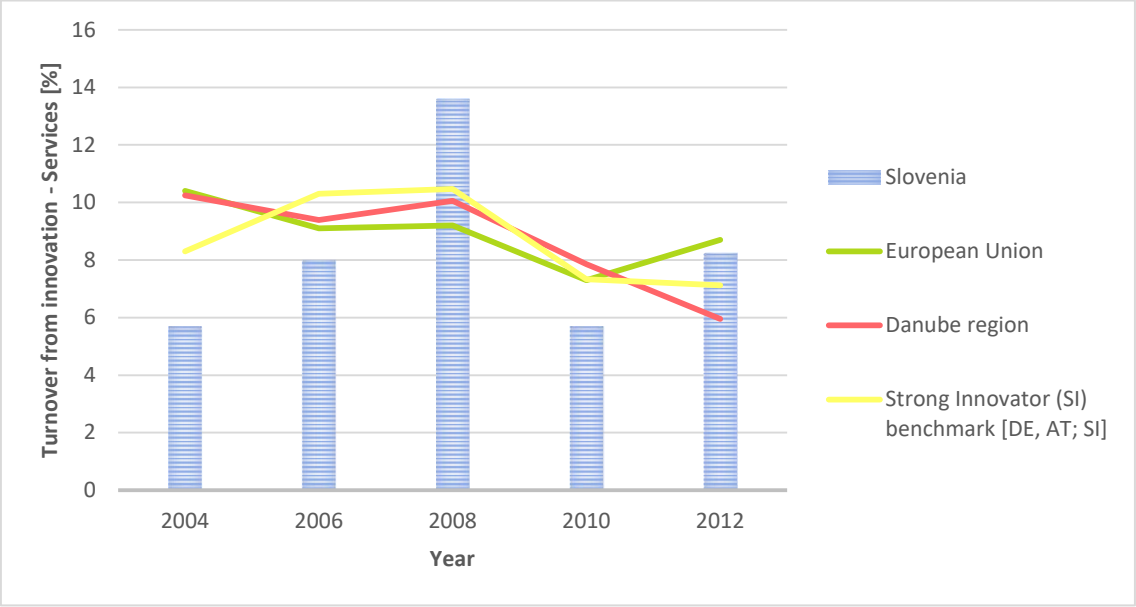


Figure 38: Turnover from innovation in services (% of total turnover) (Source: Eurostat)

OBSTACLE: The shares of turnover from innovation in both the industry and service sectors were volatile and have not continually reached comparable values to those of the EU-28. Compared to countries with higher shares of turnover from innovation (Czech Republic, Germany, and Slovakia), low shares of total turnover from products new to the enterprise and the market in both sectors illustrate that this is an obstacle from the perspective of further uptake of innovation. With reference to the total national expenditure on R&D across all sectors points to less efficient use of said funds.

Indicator: Value added by knowledge intensity (in services and manufacturing)

Value added at factor cost for knowledge-intensive services (KIS) and less knowledge-intensive services (LKIS) expressed as a share of the total value added and as a share of the value added from services has been stable in Slovenia in the period from 2007 to 2014, raising for a modest 2%. Slovenia (followed by Hungary and Germany) has the highest share of value added at factor cost for KIS and LKIS of all observed countries, on average 60% above the average of the European Union.

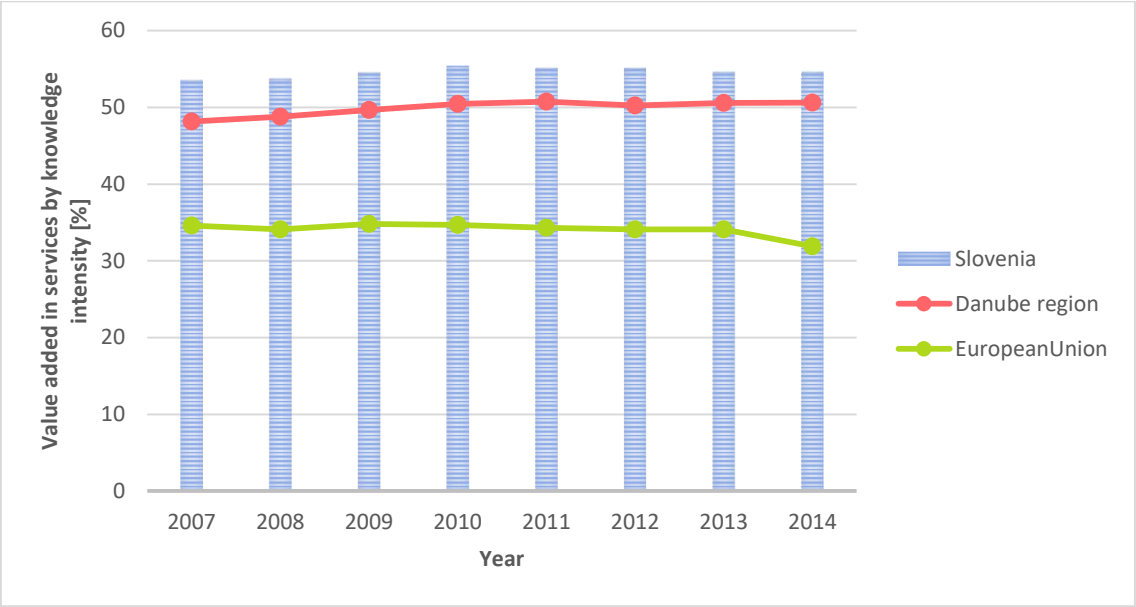


Figure 39: Turnover from innovation in services in Slovenia (% of total turnover) (Source: Eurostat)

With respect to knowledge intensive services the trend is very similar. The share of knowledge intensive services compared to total value added has been stable with a rise of roughly 5% (maximum change 11.3% with peak value reached in 2010) and on average 43.50% above the European Union and 12,6% above the Danube region.

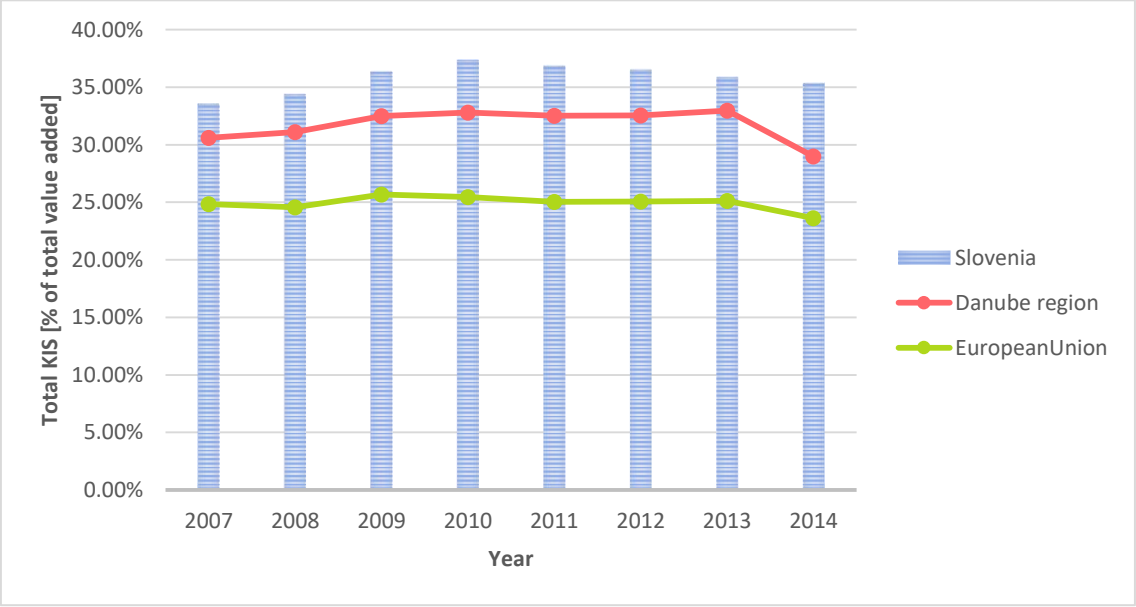


Figure 40: Total knowledge intensive services in Slovenia [% of total value added]

High-technology manufacturing as a share of total value added has declined from 2007 to 2009 from 3.55% to 3.08%, which was also the lowest documented. From 2009 Slovenia has documented a notable increase of more than 18% that stabilized in 2014. Comparably the trend for the countries in the Danube region has been very similar, albeit less expressed and moving around the average below 2%.

Indicator: Employment in Knowledge Intensive Activities (KIA) and medium/high-tech manufacturing

In Slovenia, employment in knowledge intensive activities in both manufacturing and services is below the EU average, and point to an inconsistency with the share of scientists and engineers as % of active population.

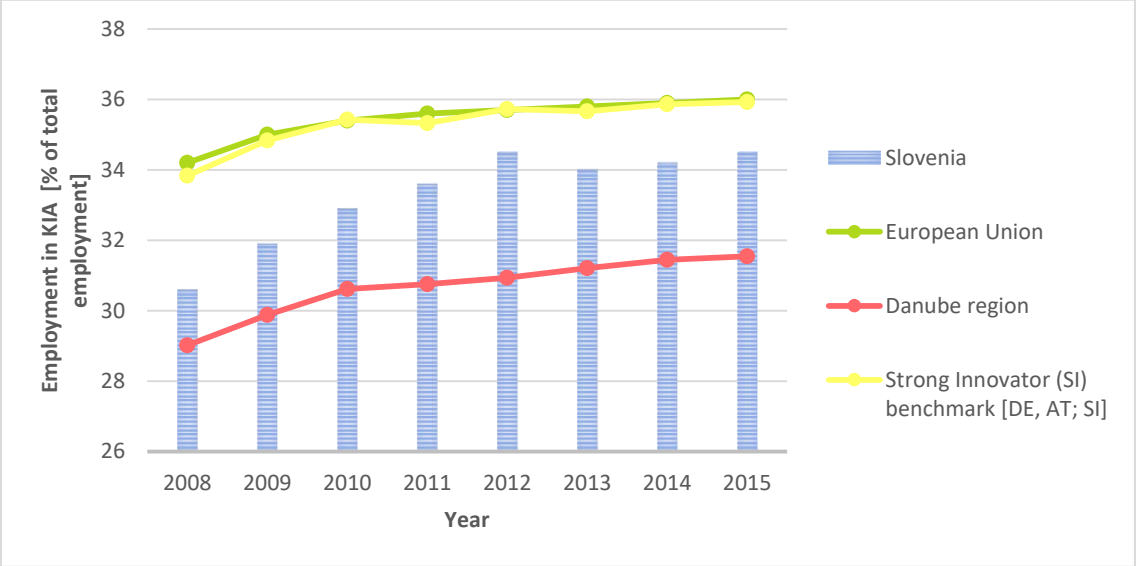


Figure 41: Employment in Knowledge Intensive Activities (KIA) as a share of total employment in Slovenia

Employment in medium-high and high-tech manufacturing as a share of total employment in Slovenia is also well below the European Union, on average 24%.

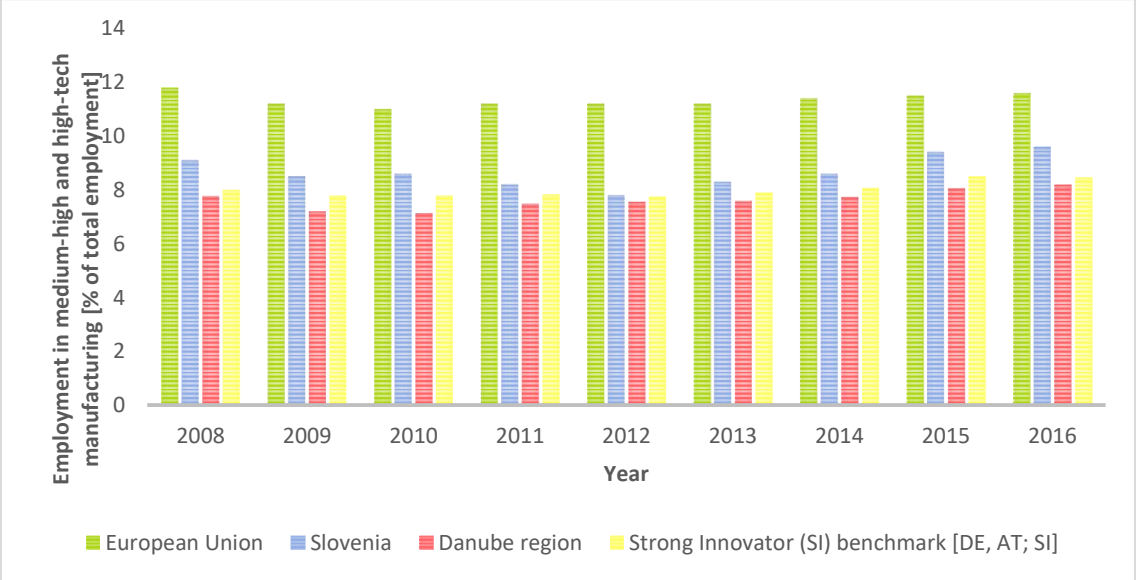


Figure 42: Employment in medium-high and high-tech manufacturing as share in total employment in Slovenia

OBSTACLE: The low level of employment in knowledge intensive activities in manufacturing and services as well as the low share of employment in medium-high and high-tech manufacturing (as a share of total national employment) is comparably low to that of the EU, which is a clear obstacle in the future development of eco-innovative products and services on the country level.

4. ENERGY

4.1 GENERAL OVERVIEW OF ENERGY SECTOR

The primary energy sources for electricity generation in Slovenia are well balanced and utilize the largest possible share of domestically available sources. Each source, namely nuclear fuels, fossil fuels and renewable energy sources provide each on third of total electricity production. Renewables are in the biggest part presented by large hydro power plants (at 4056 GWh contribution) on the Drava, Soča and Sava rivers. There is also 533 GWh total produced by biomass and solar (photovoltaic), each producing about 2% of electricity supply and an almost very small contribution from wind turbines.

All major production sources, especial for electricity, are state owned through companies Holding Slovenske Elektrarne (HSE) and Gen Energija (GEN). HSE includes the operation of lignite powered thermal power plant Šoštanj, several hydropower plants on the Drava (DEM d.o.o), Soča (SENG d.o.o.) and Sava (SRESA d.o.o.) as well as the lignite mine in Velenje (Premogovnik Velenje) and the former thermal power plant Trbovlje (TET) currently operating 2 gas turbines for backup power.
Gen Energija also operates several companies, of which the most important are the nuclear power plant Krško (NEK d.o.o.), hydropower plants on the Sava (SEL d.o.o and HESS d.o.o.) and the thermal power plant in Brestanica (TEB d.o.o.). Gen Energija also owns the ZEL-EN research and development centre for energetics and has made substantial investment into renewable energy, particularly photovoltaic power plants in the last decade.

The transmission system within Slovenia and between neighbouring countries is operated by Elektro Slovenija (ELES d.o.o), which is also state owned and has ownership stake in some dependent companies, such as the Aluminium producer TALUM d.d. The distribution network is comprised by joint stock companies (Elektro Celje d.d., Elektro Gorenjska d.d., Elektro Maribor d.d., etc.) in which the Republic of Slovenia has the majority share. However, while these companies have ownership status of the infrastructure included in the distribution network, actual billing and other public services are carried out by subsidiary limited companies (such as ECE d.o.o.). The network is regulated by the national energy agency (AGEN RS), the distribution system operated by SODO d.o.o and the main market organizer as well as operator is Borzen d.o.o.

The long-term vision of the energy sector in Slovenia is a gradual transition toward a low-carbon economy by prioritizing efficient use of energy, utilization of renewable energy sources and development of active electricity distribution networks (t.i. Smart grids). The energy mix of the future will most likely strongly rely on nuclear energy and further development of hydroelectric power sources.
The current strategic outlook foresees further upgrade and construction of new power stations on the Sava, upgrade of at least there power plants on the Drava river as well as additional small hydroelectric power projects. The investment shall create an additional 470 MW of hydroelectric capacity by the year 2020.
With respect to conventional (coal-fired) thermal power generation, the plans are based on maintaining production at existing locations, while additional facilities are focused on combined heat and power generation. In this regard, substantial investment will be required to meet environmental standards and control air pollution, especially to increase rapid response and peak energy capacity.

There are also plans for a second nuclear production facility, which has been put on hold with considerations

of available financing and public sentiment. Nuclear power plant Krško has been recently granted a life cycle extension (through 2043). Nonetheless, current forecasts show that the country will be unable to meet domestic production needs by 2025, thus tentative plans for a new nuclear block (unit) at NEK with up to 1600 MW capacity to come online by this period (2025) are developed.

There is also substantial investment planed for the transmission and distribution systems (modernization of national dispatching and local distribution control centers, the completion and renovation of the east-west 400kV transmission lines with Hungary and other general renovation measures on the transmission grid. However, a lack of financial resources is somewhat delaying these projects.

In terms of renewable energy sources, there are attempt to build at least 3 wind power plants in the Primorska region, which together would consist of 150 wind turbines. Yet, previous attempts to carry out these investment projects showed that the process will be hindered by at least a lengthy approval process further exacerbated by opposition of local communities. In addition, the capacity to produce energy from wind in Slovenia is generally very poor, so some experts also oppose the construction of such power plants with the argument that it`s not feasible to economically produce this energy, meaning that the difference would have to be one again covered by subsidies secured by final consumers. This is not meet with particular enthusiasms, as previous experience, when subsidy schemes were introduced to support the construction of photovoltaic power plants, there was substantial investment made in the sector with very little effect on the overall electricity generation. Furthermore, the electricity grid in its current form could be destabilized by introducing higher levels of renewables without making substantial investment in its adaptation as a first step.

Otherwise, Slovenia besides woody biomass and hydro capacity is poor in energy resources, thus still imports oil derivatives, liquefied gas, natural gas, even brown coal/lignite as well as electricity. Leading companies in the oil and gas sectors are Petrol, OMV Slovenia, Geoplin and Butan plin.

The energy consumption is expected to constantly increase in the foreseeable future, especially with the rise of electrical heating by heat pumps and the electrification of transport. However, several opportunities for innovative products and services exist, namely in the field of monitoring and optimizing energy consumption on the level of final consumers (energy management systems), products for energy refurbishment (thermal insulation, ventilation and recuperation systems, etc.), electricity/heat generation (next gen. wind turbines, co-generation units with high efficiency, energy production from low-enthalpy sources, waste management, etc.) and so on.

Indicator: Energy dependence

Slovenia has substantial domestically available hydro-energy sources and lignite but is completely dependent on the import of liquid and gaseous fossil fuels as well as Uranium. The overall energy dependency of the country was 48.7% in 2015 (increased 4.2% from 2014), making it a Member state with **medium dependency** considering that the average for the European Union member states (EU-28) was 54.0% in 2015. It fortified it`s long term goal of not increasing economic reliance on energy imports by the construction of the new block of the thermal power plant Šoštanj, which uses locally mined lignite as the primary energy source and can produce up to one half of electricity demand nationwide.

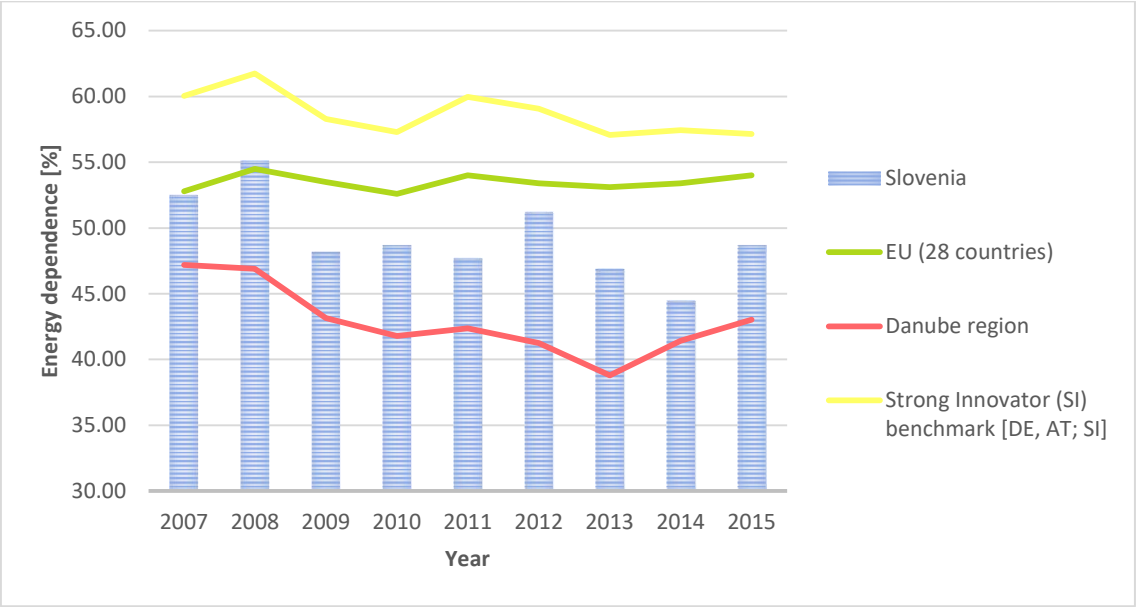


Figure 43: Energy dependence of Slovenia compared to EU-28 and the Danube region (Source: Eurostat)

OPORTUNITY: The high level of energy dependence is an opportunity for products and services that address either reduction of energy use by introducing more efficient procedures and equipment, or those that address energy generation from sources readily available on the national level (such as woody biomass, hydro-electric capacity, low-enthalpy geothermal, etc.). Slovenia has reduced its energy dependency compared to the European Union, but is still far higher than other countries from the Danube region.

Indicator: Gross inland consumption of energy divided by GDP

In terms of the energy intensity of the economy (presents the overall energy efficiency), which is construed as the gross inland consumption (calculated as the sum of gross inland consumption of five mayor energy types including coal, electricity, oil, natural gas and renewables) of energy divided by the national GDP, Slovenia is well below the average of the Danube region. It indicates that the national economy has a lower cost of converting energy into GDP than the average country in the Danube region. While on average, the Danube region requires about 269 kg of oil to produce 1000 EUR of GDP, Slovenia requires 195 kg and developed countries included in the strong innovator benchmark only 142 %, which is more than 25% less. However, with reference to the current trend, Slovenia was able to reduce this divide with more developed countries particularly in the years 2014 and 2015.

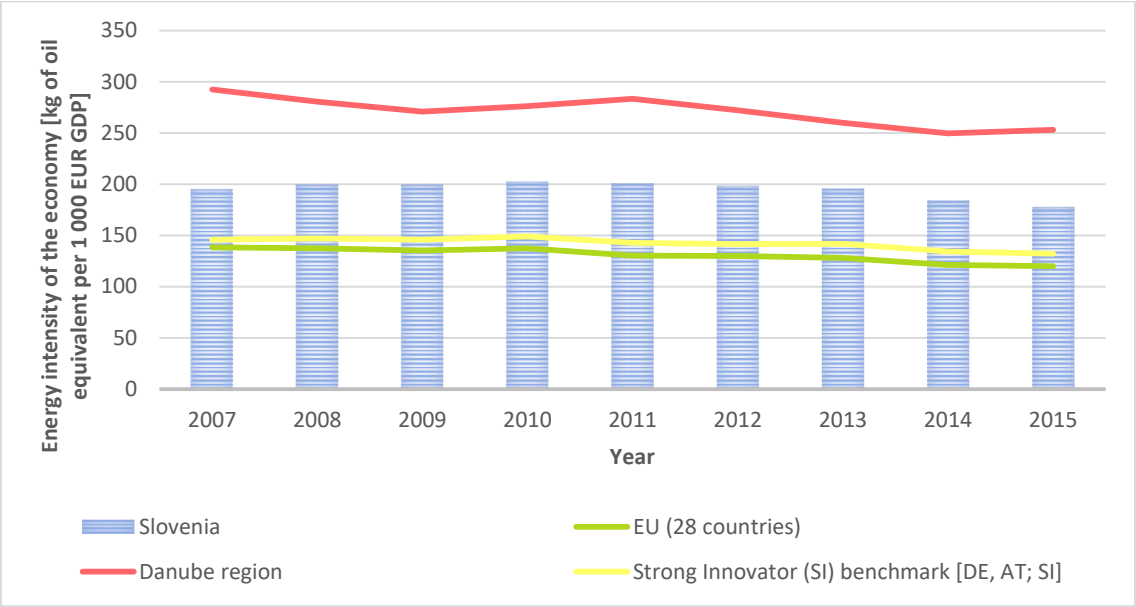


Figure 44: Energy intensity of the Slovenian economy (Source: Eurostat)

OPORTUNITY: Compared to the countries of the Danube region, Slovenia has a substantial advantage in using less energy to produce the same amount of economic activity (from this perspective making products and services more affordable). Slovenia was thus somewhat successful in decoupling GDP growth with energy consumption, however, there is still a large gap between Slovenia and countries from the strong innovator benchmark, with more efficient economies.

Indicator: Share of renewable energy in gross final energy consumption

Along with Austria, Croatia and Montenegro, Slovenia with 22 % in 2015 had one of the highest shares of renewable energy in gross final energy consumption. This is mostly due to the substantial hydroelectric capacity on the Drava, Sava and Soča rivers. The national target is to achieve an overall 25 % share of renewable energy in gross final energy consumption by 2020, which means an additional increase from the present by about 3%. By far the most progress was achieved in the area of heating and cooling where Slovenia managed to increase the share of RES from 19.2% in 2008 to 34.1% in 2015, marking a 77.6% improvement and surpassing the national target for 2020, which is 30.8%. In the field of electricity and transport, the status is much less favourable, whereby the share of electrical energy from RES was only 32.7% (even including the production from large hydropower plants) compared to the target for 2020 which is 39.3%. Transport in particular has not kept pace with the projected development for reaching the 2020 target of 10,5%, stalling at 2.2% in 2015.

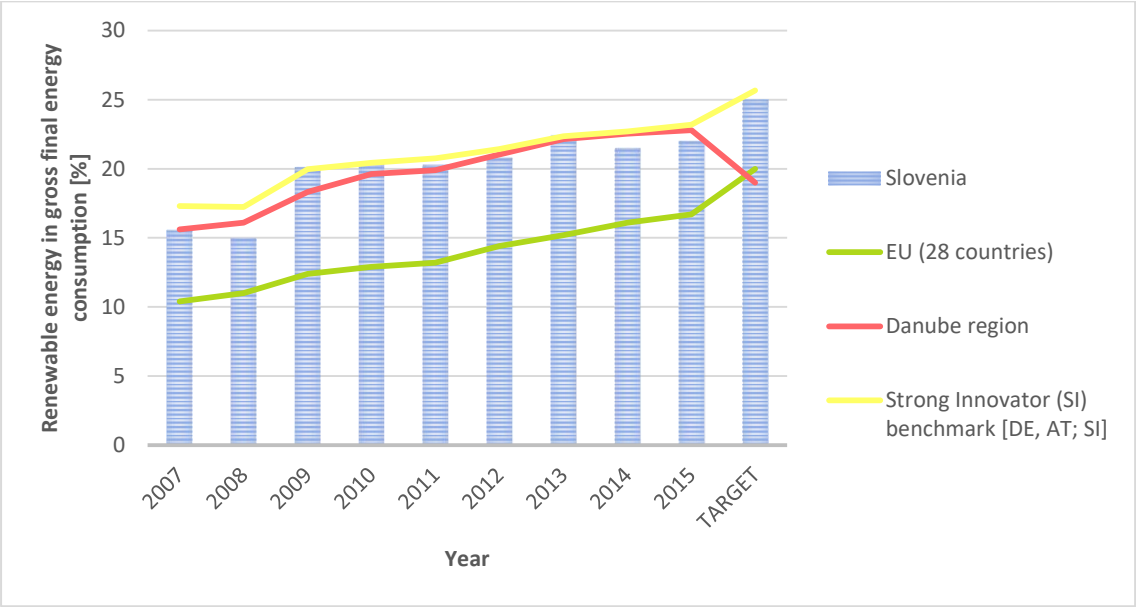


Figure 45: Share of RES in final energy consumption in Slovenia (Source: Eurostat)

OPORTUNITY: Slovenia has compared to the strong innovator benchmark decreased the gap and is very likely to achieve the overall target of 25 % in 2020. Slovenia should focus on increasing this share further, however concentrating its investment into technologies that make sense, economicaly and from a supply side perspective (available capacity), for the country. This includes co-generation units powered by woody biomass, further adaptation of air-water and water-water heat pumps and in a limited scope (Primorska region), photovoltaic power stations. There is substantial opportunity for businesses that work in the field of producing energy generation and transportation systems, IT for smart, distributed energy systems and other relevant areas.

Indicator: Electricity generated from renewable sources

The total nominal power of production units included within the national support scheme for renewables reached 412 MW in 2016, producing 1003.5 GWh of electrical energy. Comparatively, Slovenia has not matched the positive trend of the strong innovator benchmark and has also been surpassed by several countries from the Danube region. Compared to the European average which increased from 16.1% in 2007 to 28.8% in 2015 (a 78.8% improvement), Slovenia has also lost a lot of ground. Whereby the trend for both the Danube region and the EU have been positive and stable, the share of electricity generated from renewables in Slovenia was very volatile. In total, it was increased from 27.7% to 32.7%, marking only a 18% increase from 2007.

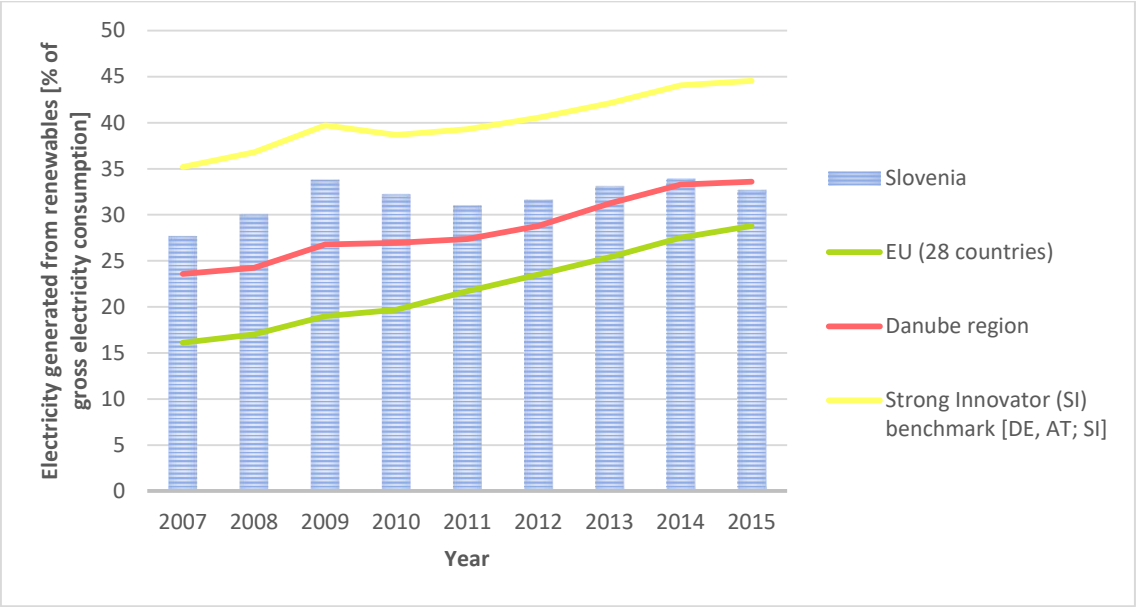


Figure 46: Share of electricity generated from RES in Slovenia (Source: Eurostat)

OBSTACLE: Slovenia is evidently struggling to increase its share of electricity generated from renewable sources substantially beyond the threshold of 33% that it achieves mainly because of the large national hydroelectric potential. To overcome this obstacle, large-scale investment, particularly into technologies powered by woody biomass, waste and to a certain extent PV and geothermal.

Indicator: Combined heat and power generation

In terms of production of electricity from combined heat and power units, in relative terms the value has remained more or less stagnant and well below almost all other countries observed (falling in front of only Bulgaria) within the observed period. While the average share of gross electricity generation from CHP was 11.2% in Europe and 16.1% in the Danube region, it`s clear that Slovenia lags far behind comparable countries, just barely exceeding 7%.

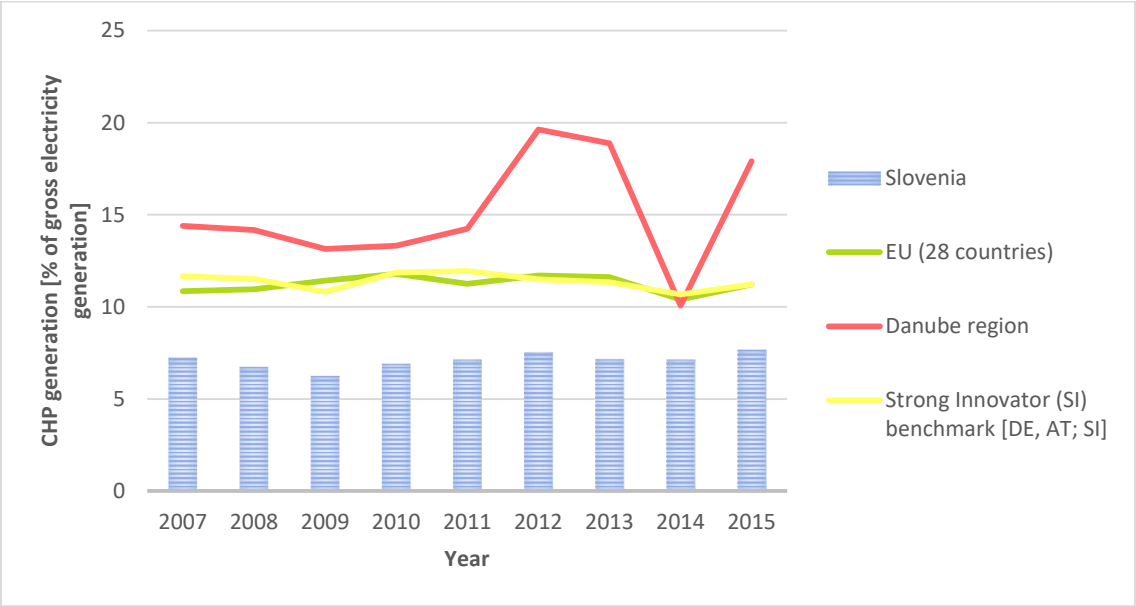


Figure 47: Share of gross electricity generation from combined heat and power generation (Source: Eurostat)

OBSTACLE: The country has comparatively a very low share of electricity production from cogeneration of heat and power. For a small country, relatively poor in energy resources, its essential that the energy system would utilize a larger share of CHP units with high efficiency. The most favourable scenario would be to introduce CHP units powered by biomass, however significant reduction of imported fossil fuels like natural gas could also be achieved.

Indicator: Greenhouse gas emissions intensity of energy consumption

The greenhouse gas intensity of energy consumption is the ratio between energy-related greenhouse gas emissions (carbon dioxide, methane and nitrous oxide) and gross inland energy consumption. The index shows that Slovenia has done very well in mitigating the sources of GHG over the observed period, reducing the emissions faster than energy consumption. The average of the Slovenia was slightly above the EUs average at 92.6 and well below the average of the Danube region at 93.45. In 2014, the index fell well below the averages of both the EU and the Danube region, as well as compared to the strong innovator benchmark, joining the most effective countries like Austria, Hungary and Slovakia.

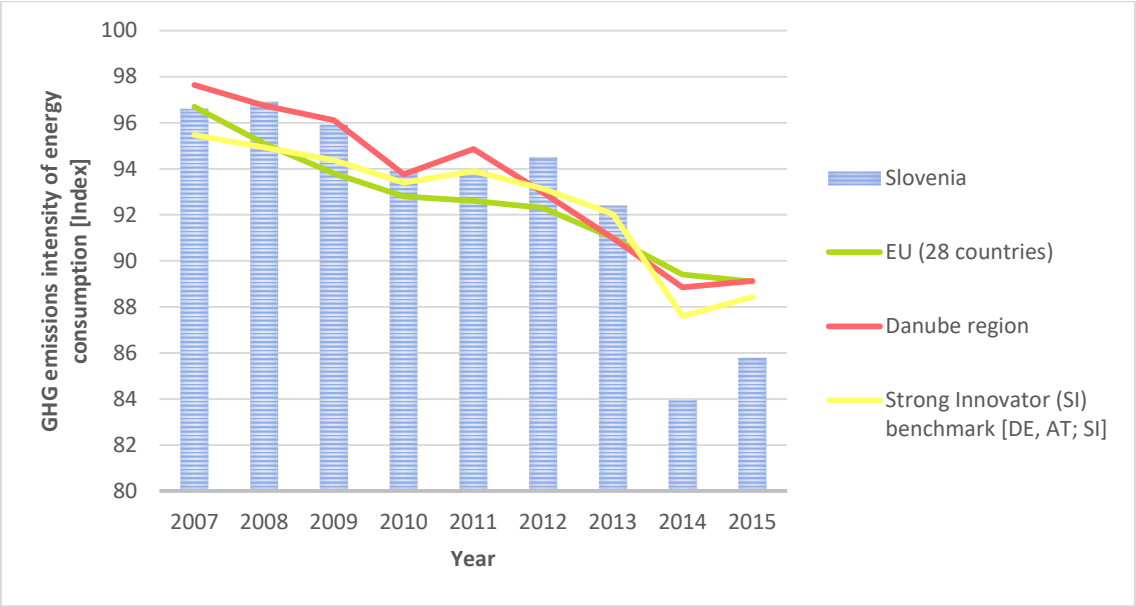


Figure 48: GHG emissions intensity of energy consumption (Source: Eurostat)

OPORTUNITY: The country has successfully reduced its GHG intensity, which may present a competitive advantage in the future, compared to economies with higher emissions output, if a fair emission trading system would be introduced and enforced.

Indicator: Total primary production of energy

Total primary production of energy peaked in 2010, but has generally remained stable in the period from 2007 to 2015. Production has increased 31% within the observed time period, opposite to the trend observed for the Danube region and the EU. On a per capita basis, Slovenia produced on average 480% less than the EU average and even 789% less than the average of the Danube region.

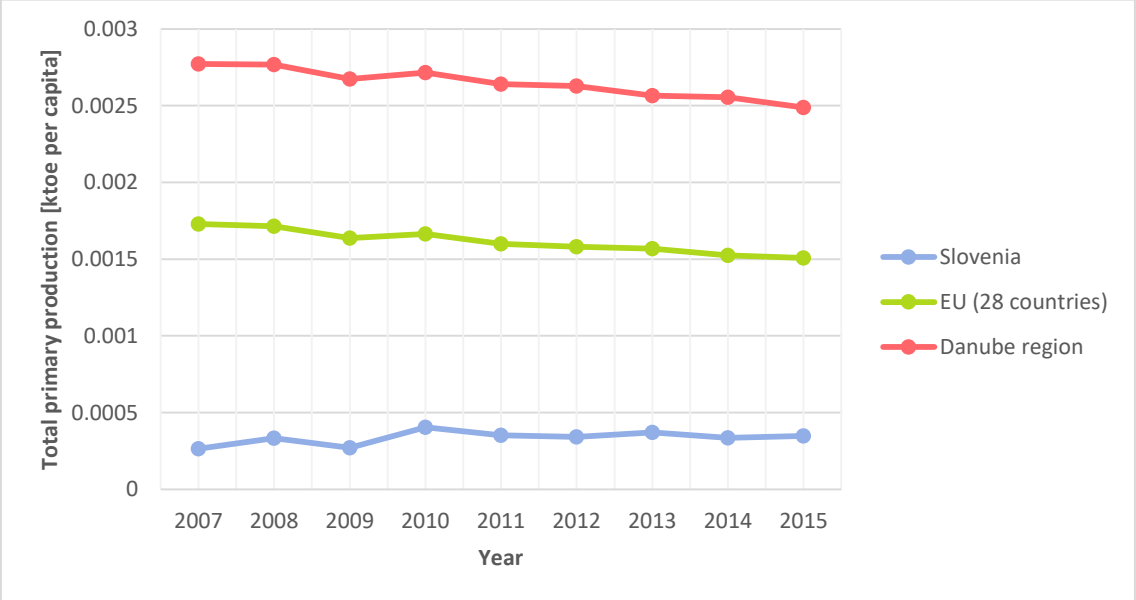


Figure 49: Total primary production [ktoe per capita] (Source: Eurostat)

OBSTACLE/ OPORTUNITY: Considering that both the energy intensity (gross inland consumption of energy divided by GDP) and the intensity of GHG emissions has declined within the observed time period, the rise of total primary production of energy can be seen as neither an obstacle nor opportunity, rather than a necessary increase to service increased demand of the nation's economy.

Indicator: Total primary production of renewable energy

Slovenia has not substantially increased its primary production of renewable energy, compared to neighbouring countries. While Austria and Hungary managed to increase their production by more than 20% and 142% (from 7715.3 ktoe to 9303.3 ktoe and 1336.6 ktoe to 3239.9) respectively, Slovenia has only seen a modest increase in absolute terms (+299,6 ktoe) in the period. The majority of primary production of renewable energy (590.2 ktoe) was contributed from solid biofuels (mostly for space heating) followed by hydroelectric units that contributed 327.4 ktoe in 2015. Solar power was the source of 26.6 ktoe (photovoltaic) and 10.9 ktoe (solar thermal-mostly for the preparation of sanitary hot water) energy production. In addition, 29.7 ktoe was produced from biogas and 39.5 from geothermal sources. Wind power only contributed 0.5 ktoe. Contributions from other sources are negligible.

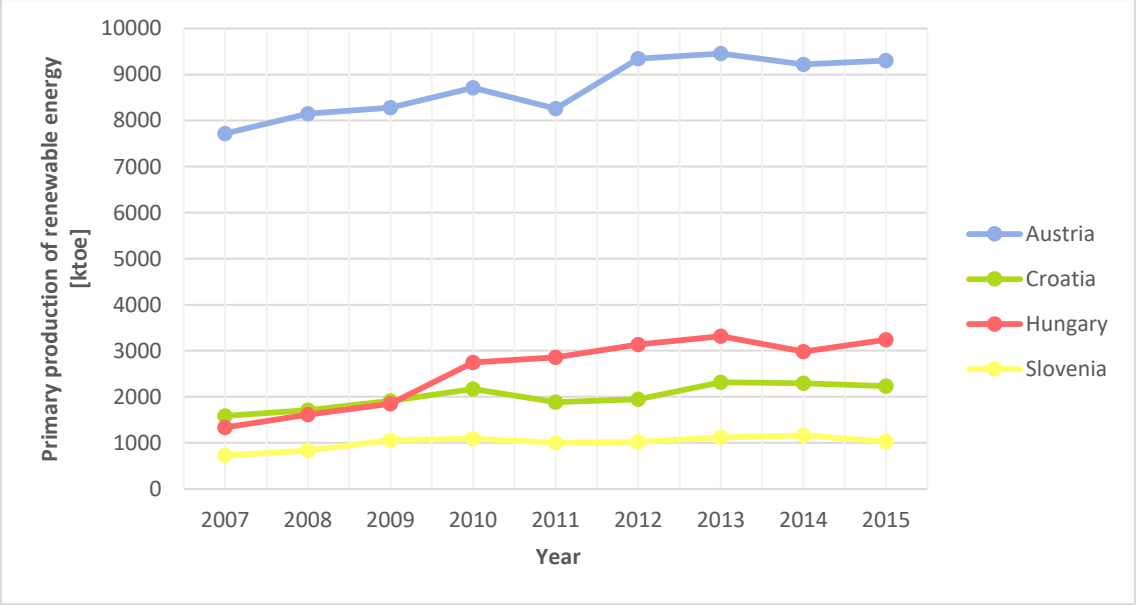


Figure 50: Primary production of renewable energy (Source: Eurostat)

OBSTACLE/ OPORTUNITY: Slovenia has not been able to match the growth trend observed in neighbouring countries. The slow uptake of energy production from renewable sources can be considered an obstacle if the trend of stagnation should continue in the foreseeable future. However, considering the very low scope of installed capacity to harness renewable energy sources, there are noteworthy opportunities for investment and optimization (for e.g. installation of wind-turbines, solar panels, heat pumps, etc.)

Indicator: Energy consumption of transport relative to GDP

The energy consumption relative to the national GDP has been on a decline in most reviewed countries, with the exception of Bulgaria and Croatia. Conversely, Slovenia with respect to the reference year 2010, has noted an increase of the energy consumption in transport until 2012, when it reached peak value and began to follow the declining trend of the EU and the Danube region. Taking into consideration that Slovenia is a transit country, connecting the South-Eastern and North-Western Europe, this is an expected result, whereby the most notable impact was caused by the increase of commercial road, rail and maritime transport.

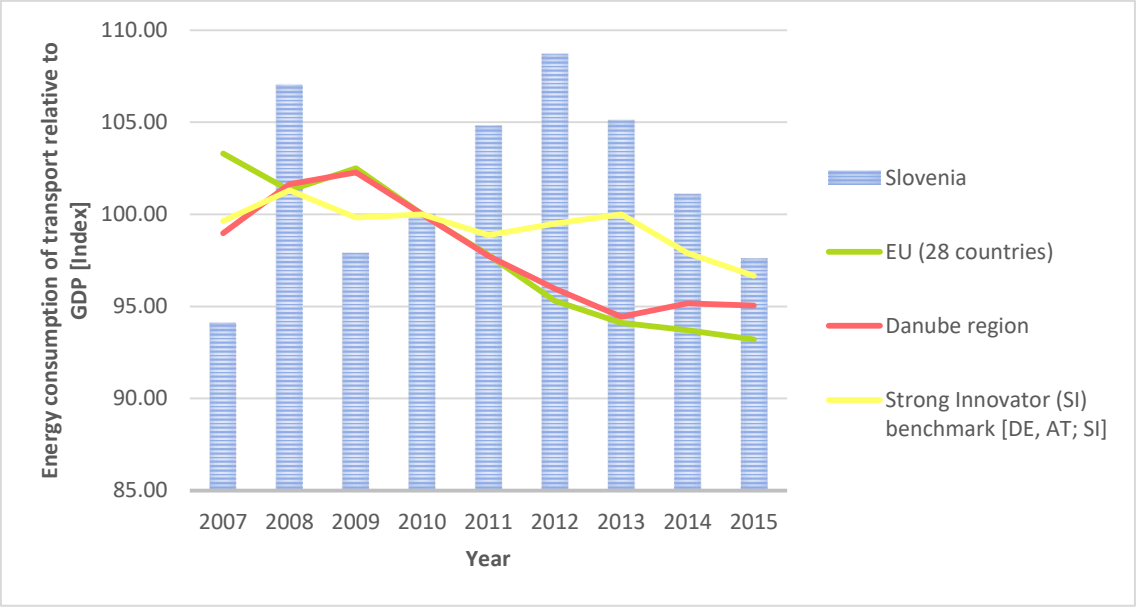


Figure 51: Energy consumption of transport relative to GDP [Index] (Source: Eurostat)

OPORTUNITY: Slovenia has a unique opportunity on several areas relevant to eco-innovation, for instance innovative approaches to dispatch the road transport to rail or air. In the current situation, the country is able to collect a substantial amount of road use and fuel taxes, which can be spent on optimizing mobility for its residents and improve the existing infrastructure.

Indicator: Electricity consumption by households

Consumption of electricity in Slovenian households (820,541 private households documented in 2015), has remained fairly constant in the range from 0.12 to 0.14 toe (1395.6 - 1628.2 kWh). On a per capita basis, the consumption almost matched the EU average in 2015, closing an approximate 8% gap with reference to 2007. The positive trend of electricity consumption in private household is forecasted to substantially increase in the following years due to widespread installation of heat pumps for space and water heating as well as the gradual shift toward electro mobility (increased number of EVs).

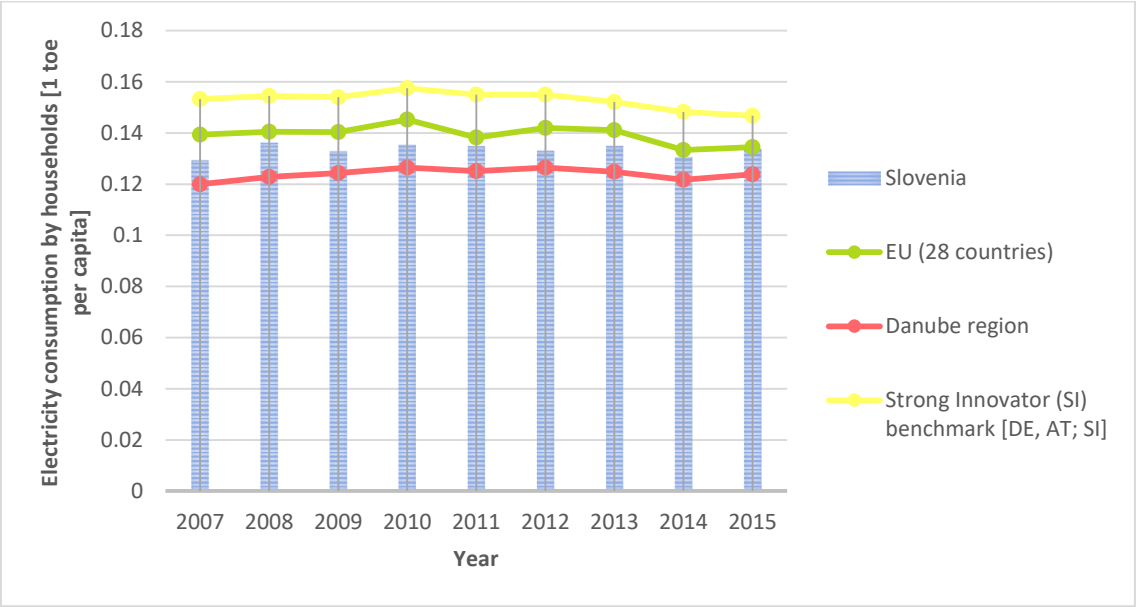


Figure 52: Electricity consumption by households [1 toe per capita] (Source: Eurostat)

OPORTUNITY: The price of energy directly dictates the extent to which it`s economically feasible to improve products and services that reduce energy for the final consumer. A substantial increase in price will also increase demand for energy efficient products and positively influence virtuous behaviour on the level of final consumers.

Indicator: Energy productivity

Energy productivity (productivity of energy consumption expressed as the ratio between GDP and gross inland consumption of energy) in Slovenia is very comparable to the average of the Danube region. From 2007 energy productivity has improved by less than 10%, while comparably, the productivity of the Austria, Germany and the EU has increased 7%, 14% and 15% respectively. Slovenia was however the only country in addition to Austria and Germany to achieve a value of over 5 Euro per kilogram of oil equivalent (58.15 kWh).

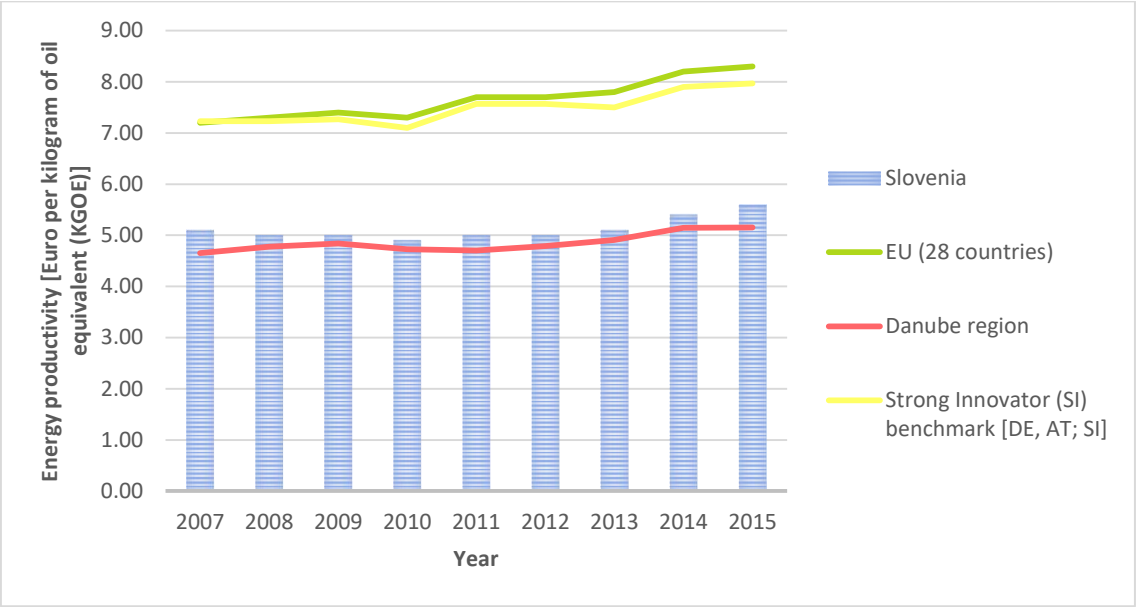


Figure 53: Energy productivity [Euro per kilogram of oil equivalent] (Source: Eurostat)

OPORTUNITY: Energy productivity in Slovenia is somewhat better, compared to most other countries from the Danube region. Taking into account the state of infrastructure and equipment used within the economy (compared to developed countries) this can be viewed as a good result and a possible competitive advantage.

Indicator: Electricity prices in households

Electricity prices rose by 52% from 2007 to 2016, which is comparable to the 45% increase of the average of strong innovators and almost the same as Germany (Austria +32%, Germany +52%). Comparatively, electrical energy prices are much lower in comparison than the EU, however matched and surpassed the average of the Danube region in 2011. Compared to neighbouring countries excluding Italy, Slovenian households (up to 3500 kWh/annum) payed the most for their electricity after Austria (0.234 EUR). The price increase has peaked in 2014 and stagnated in the following year, which matches both the trend observed in the EU and the Danube region.

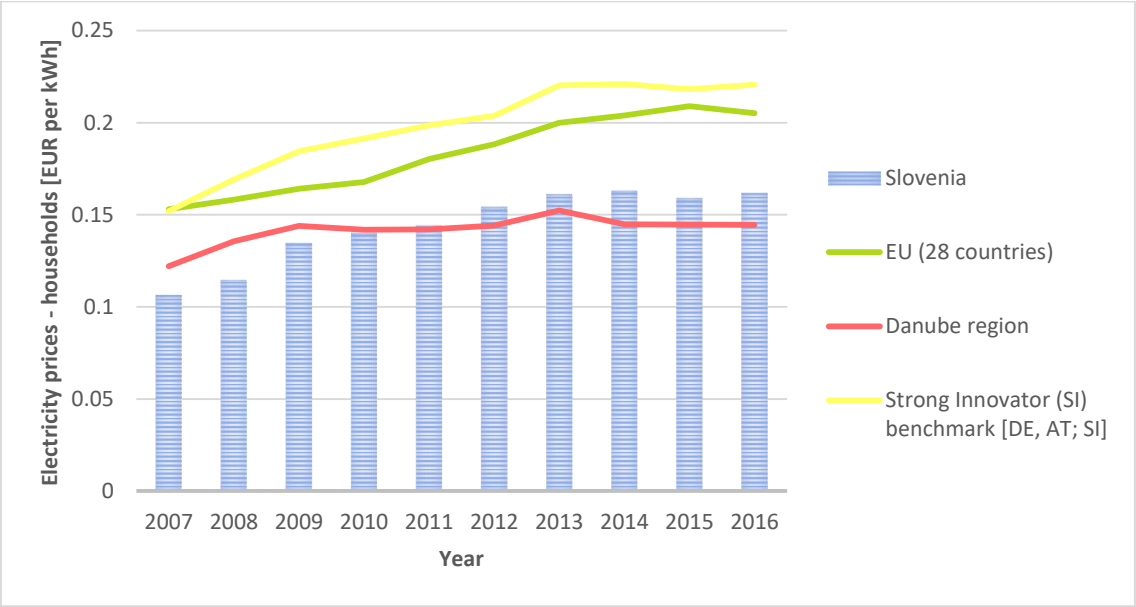


Figure 54: Final price for electricity for households from 2007-2016 (Source: Eurostat)

The price of actual energy has only increased by 21.9 %, while VAT and excise duty has increased from 20.51 to 29.88 EUR/MWh (+45.7%) and electrical grid surcharge from 50.23 to 56.74 EUR/MWh (+13%). The largest increase is due to the introduction of contributions for energy efficiency, the support scheme for renewable energy and cogeneration and contribution for the energy market operator/regulators, which was introduced at the beginning of 2009 and reached 17.96 EUR/MWh (11% of the total price) in mid 2016. The price for electrical energy peaked in mid-2012 at 62.30 EUR/MWh and declined almost 10% until 2016.

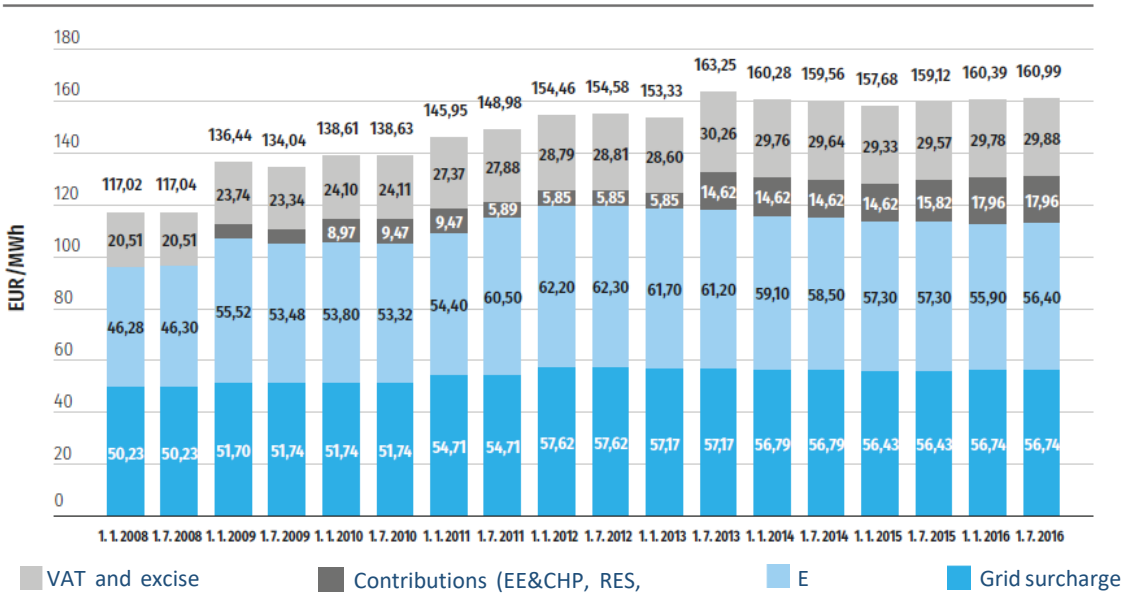


Figure 55: Final price for electricity for households from 2008-2016 (Source: National Energy Agency, RS)

Indicator: Electricity prices in industry

Electricity price in industry have peaked with the onset of the global financial crisis in 2009 and have not

recovered since. Final price of supplied electrical energy for offtake of industry (without VAT) was 85.1 EUR/MWh in 2016, which is 4% less than the same period in 2015. The decrease of retail prices was the result of the activity on the energy markets. The price model for industry offtake is frequently designed in a way that allows direct or indirect connection with wholesale energy prices, which reduced the associated financial risks of both parties.

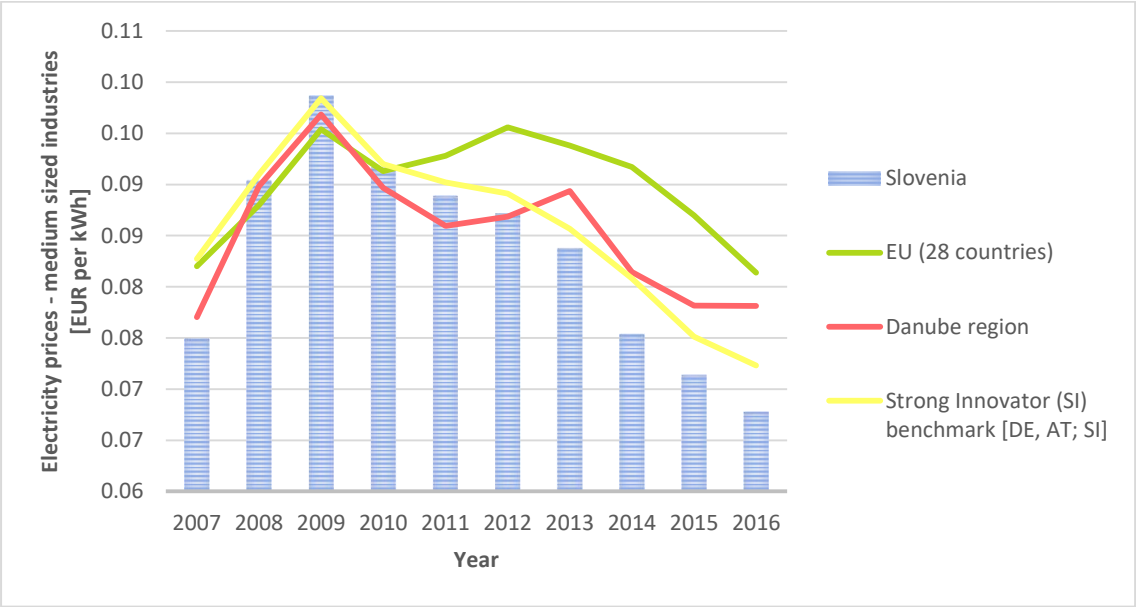


Figure 56: Electricity prices - medium sized industries (Source: Eurostat)

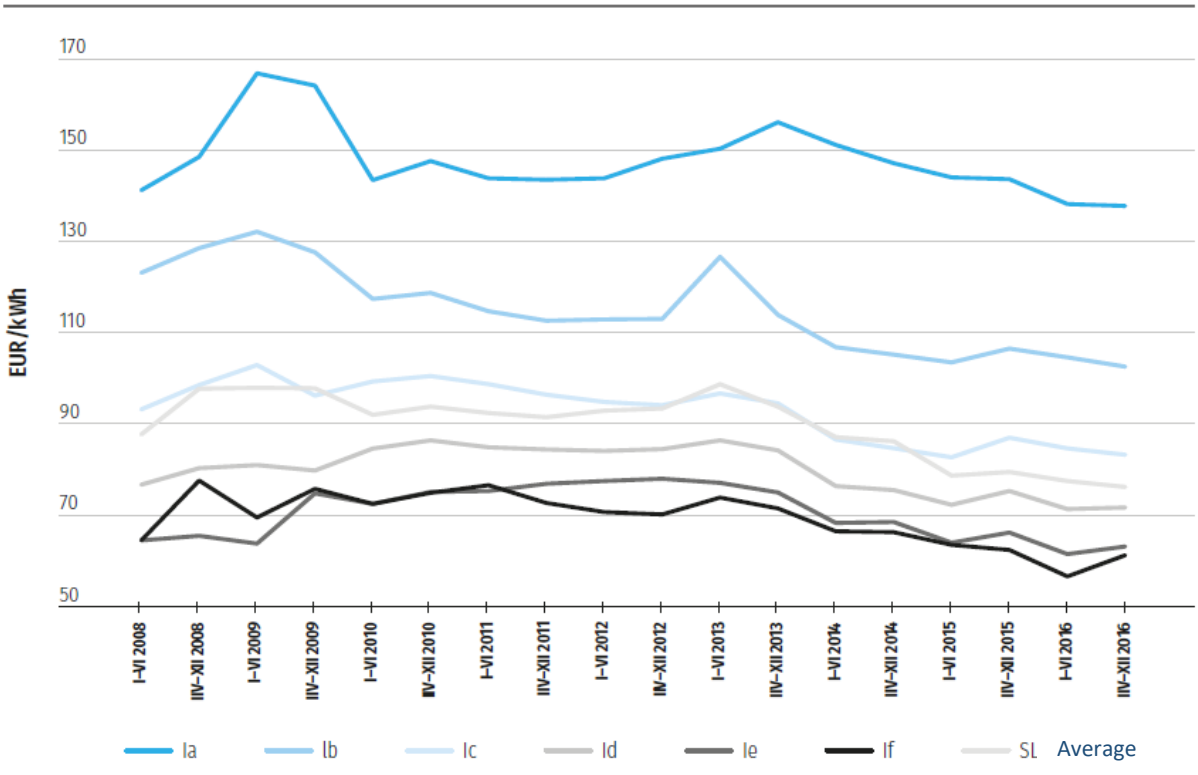


Figure 57: Final price for electricity for industry from 2008-2016 (Source: National Energy Agency, RS)

4.2 NATIONAL ENERGY POLICY

The main piece of legislation governing the organization of the energy sector in Slovenia is the renewed **Energy Act EZ-1** (the Official Gazette of the Republic of Slovenia, No 17/2014), which entered into force on 22 March 2014. The Energy act transposes a number of EU directives (most notably Directive 2012/27/EU – EED of the European Parliament and of the Council of 25 October 2012 on energy efficiency and Directive 2010/31/EU – EPBD of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings) concerning electricity and gas markets, energy efficiency and renewable energy sources. It institutes the principles of energy policy, principles and measures in order to ensure security of supply, as well as it regulates the area of energy infrastructure and heat distribution.
The Energy Act was first amended in 2015 so to conform with the resolution of Consumer Disputes Act that are related to the responsibility of energy suppliers to provide consumers with simple, transparent and free procedures for handling consumer complaints.

Throughout 2016 and 2017, further key acts relevant to the implementation of the Energy Act as well the EUS Third package of energy legislation where adopted. This included the Decree on the operation of the natural gas market, the Decree on renewable energy source in transport, the Decree for establishing the infrastructure for alternatives transport fuels, Rules on support for electricity generated from RES and CHP units with high efficiency and the amendment of rules on the balancing of the market for electrical energy.

Specific sectors are addressed within national action plans and operational programmes:

National Energy Efficiency Action Plan Action for the period 2017-2020 (AN-URE 2020)
National target to improve energy efficiency by 20% by 2020, in line with the requirements set out in Directive 2012/27/EU (Energy Efficiency Directive). This target states that primary energy consumption will not exceed 7.125 million toe (82863.75 GWH) in 2020, meaning that it may not exceed the 2012 figure by more than 2 %.

National Renewable Energy Action Plan 2010-2020 (AN-OVE 2020)
The National Renewable Energy Action Plan (recast 2017) sets out the long-term developmental goals and trajectories of energy systems and energy supply in Slovenia considering the 25-percent share target of RES in gross final energy consumption. It covers national policy of renewable energy sources of energy, expected gross final energy consumption in the period 2010-2020, targets and trajectories regarding renewable energy sources, measures for achieving binding target shares of renewable energy sources as well as estimates of the contribution of individual technologies to achieving the target shares of renewable energy sources and estimates of the costs of carrying out measures and of impacts on the environment and on job creation.

Operational Programme for the reduction of GHG emission (OP-TGP)
The Operational Programme (set out in 406/2009/ES) covers emission from the use of fuels in households and within the service sectors, emission from transportation, emission from the energy sector, process emission from industrial production, agriculture and waste management. The national target is defined as a cap on emission (emission will not increase more than 4% compared to the reference year 2005 and that total emission in 2020 will not exceed 12.117 thousand tons of CO2 equivalent.

Long-Term Strategy for Mobilising Investments in the energy renovation of buildings (DSEPS)

The strategic objective of Slovenia is to achieve carbon-neutral energy use in buildings by 2050. The basic scenario foresees a rate of complete energy renovation of residential buildings of 2% (up to 2030 approx. 1.75% of single-family houses and 2.5% of multi-apartment buildings) and 3% for public buildings.

The intermediate targets set out in the DSEPS (up to 2030) are to reduce end-use energy consumption in buildings by 15% by 2020 (and 30 % by 2030) relative to 2005, to have at least two-thirds of energy in buildings produced from renewable energy sources, to reduce greenhouse gas emissions in buildings by 60 % by 2020 (and at least 70 % by 2030) relative to 2005, to carry out energy renovation on at least 26 million m2 of building floor area or 1.3–1.7 million m2 annually, with just over one third of this total renovated to nearly zero-energy building standard (AN sNES).

The Strategy's operational targets is the renovation of 3% of public buildings owned or occupied by central government each year, the renovation of 1.8 million m2 of the floor area of buildings in the wider public sector between 2014 and 2023 (OP EKP), an improvement in the ratio between public funds invested and investment incentives in the public sector to 1: 3 (OP TGP 2020), the implementation of five energy renovation demonstration projects for different building types (OP EKP).

National Energy Concept (EKS)

The Energy Concept of Slovenia (EKS) is the basic development document in the field of energy, which in accordance with the Energy Act (EZ-1) on the basis of projections of the economic, environmental and social development of the country and on the basis of the adopted international commitments, sets the goals of reliable, sustainable and competitive energy supply for a period of the next 20 years and an indicative period of 40 years.

Sustainable Energy Action Plans and Local Energy Concepts (SEAP)

Sustainable Energy Action Plans are key documents of local government plans to achieve green-house gas emission reduction targets, which contain guidelines for the implementation of investment, innovation and coordination and support projects as well as investment measure into energy efficiency, renewable energy and green mobility with reference to the current local situation

Legislation that indirectly outlines the framework of certain specific areas (such as energy performance/supply contracting) includes:

- Public Private Partnership Act (Official Gazette n. 127/06), passed on November 23rd 2006
- Public Procurement Act (Official Gazette n. 12/13), passed on November 23rd 2006
- Act Regulating Public Procurement in Water, Energy, Transport and Postal Services (Official Gazette RS n. 72/11), passed on November 23rd 2006
- Rules on the efficient use of energy in buildings (PURES), passed on June 22nd 2010
- Technical Guideline Efficient Use of Energy (TSG-1-004:2010 URE) passed on July 11th 2012

5. ENVIRONMENTAL PROTECTION

5.1 ENVIRONMENTAL CHALLENGES

Slovenia is one of the smallest and most diversified countries in Europe in terms of its landscape, climate and biodiversity (wide variety of habitats, where only 1% of all types of organisms live on only 0.004% of the earth's surface).

Slovenia is a medium to less-settled European country with only 102 Slovenes living on a square kilometre of land, which is more than in many Eastern European countries, but significantly less than in the most populated Malta and the Benelux countries. Slovenia is a hilly country with a very large forest area - according to Eurostat data, this amount was as high as 63% of Slovenia's surface in 2015 (only Finland and Sweden have a greater shares of the forest). In addition, we have the highest share of land surface that is in some way protected to conserve biodiversity - as much as 38%. However, this is also one of the reasons that the share of agricultural areas are among the lowest in Europe - only about 23% of the total area of Slovenia is agricultural and only a little 8% are arable.

The most notable threat to Slovenia in terms of protecting its environment is poorly planned and managed waste management on the national level and support for environmentally questionable investment of foreign companies. This became clearly evident in 2017, when a hazardous waste facility in Vrhnika KEMIS d.o.o. caught fire, which exposed the lack of regulation, lack of documentation on stored materials, poor enforcement and responsiveness of the safety inspector, poorly defined fire safety standards and controversial issuance of a environmental permit that allowed the facility to operate despite all of its evident shortcomings. The company was responsible to store and manage about ¼ of total hazardous materials produce nationwide, thus the fire had a devastating impact on the local surroundings.

In addition, supporting investment in industries with high labour intensity (for e.g. the varnish facility of Magna constructed in the Podravje region) and ambiguous effects on the local communitiy also poses the question, who will take the responsibility for environmental damage in the event of a mayor catastrophe.

Indicator: Public sector expenditure for environmental protection

The expenditure on environmental protection relevant to the national GDP by the public sector has been above that of the average of the European Union and on average surpassed the average of the Danube region by almost 60%. The expenditure considers all funds spent on purposeful activities directly aimed at the prevention, reduction and elimination of pollution or any other degradation of the environment and includes everything from environmental investments, current expenditures and subsidies/transfers.

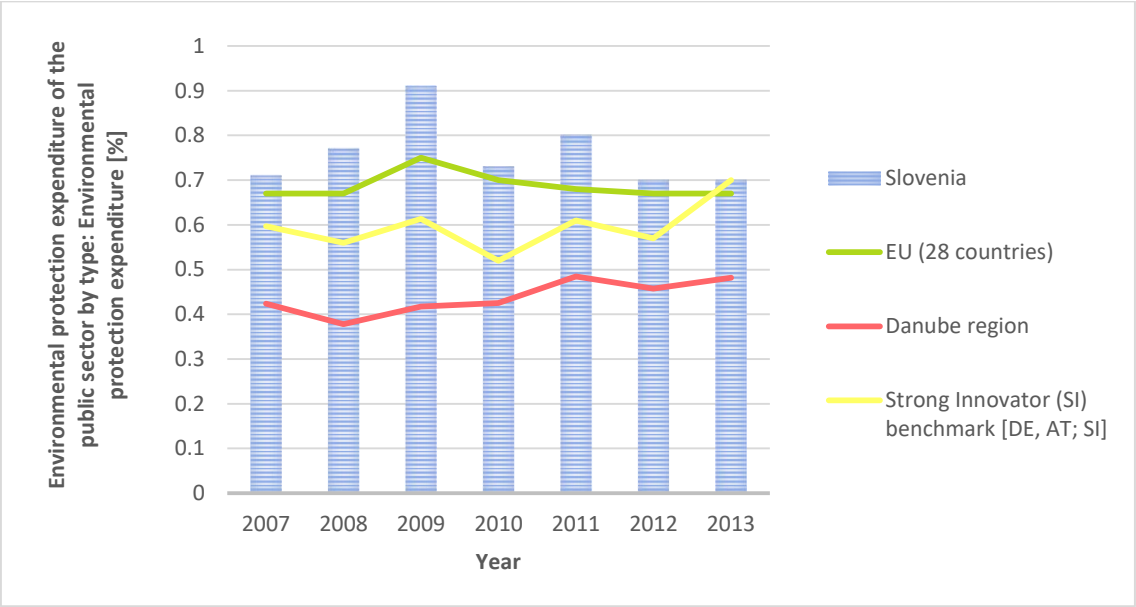


Figure 58: Final price for electricity for industry from 2008-2016 (Source: National Energy Agency, RS)

OPORTUNITY: Public sector expenditure for environmental protection is at a very high rate. However, in relative terms has peaked in 2009 and declined by more than 0.2% until 2013. Real GDP growth in the same period was 1.2% in 2010, 0.6 % in 2011 and -2.7% and -1.1% in 2012 and 2013 respectively. This indicates a decline also in absolute terms and does not project a favourable trend. None the less, strong GDP (+3.1%) growth resumed from 2014 onwards and provides additional funds that are spent on environmental protection measures presently. Compared to the Danube region and the EU, Slovenia has a very healthy level of public environmental expenditure.

Indicator: Greenhouse gas emissions per capita

Greenhouse gas emissions have been on a steady decline within the observed period across all countries in the Danube region. Slovenia has been able to remain below the EUs average and finished 2015 at only 8.2 tonnes of CO_2 equivalent per capita, about 6% less compared to the EU. In 2014, the lowest value within the 2007-2008 period was documented at 8.09 tonnes per capita, whereby the value dropped also below the average of the Danube region (8,37 tonnes) for the first time. Compared to the strong innovator benchmark, Slovenia has a substantially smaller contribution of GHG emission in all observed years. Austria finished 2015 at 9.44 tonnes and Germany at 11.41 tonnes. Slovenia also documented the largest decrease of all analysed countries except Croatia.

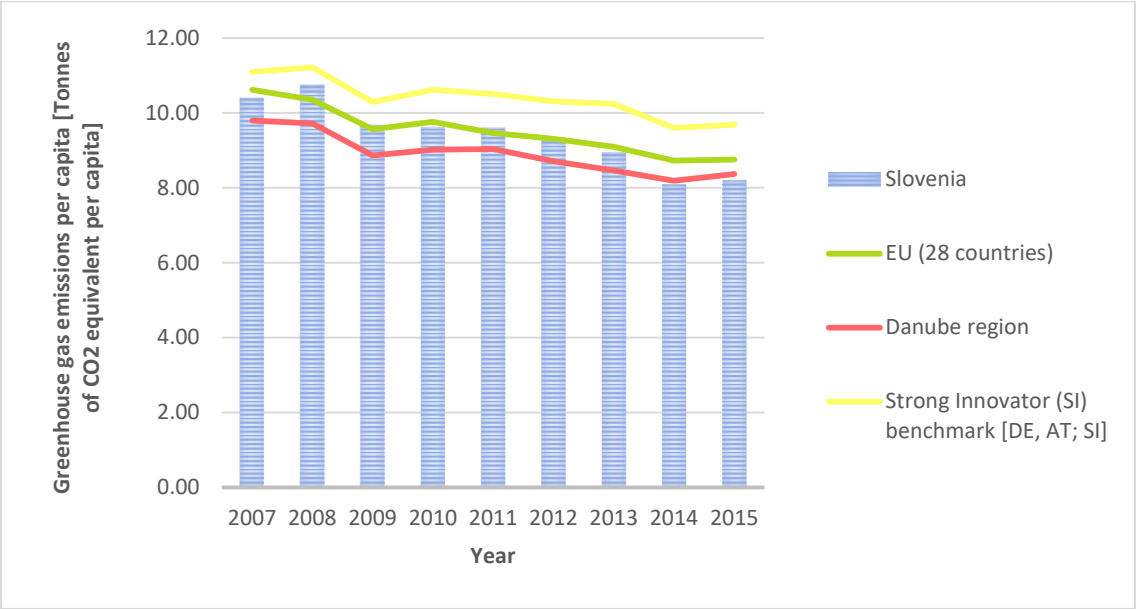


Figure 59: Greenhouse gas emissions per capita (Source: European environment agency EEA)

OPORTUNITY: The relatively low contribution of GHG emissions per capita and a notable trend of further reduction compared to similarly developed country positions Slovenia amongst very efficient territories, which is a definitive advantage in terms of emission trading and future development of its economy.

5.2 ENVIRONMENTAL TAX

Indicator: Environmental tax revenues

Slovenia has continually increased the share in gross domestic product that it acquires through various environmental taxes (base as a physical unit or proxy of something detrimental to the environment) including transport, energy, pollution and resources. On average, the EU as well as the Danube region have not substantially increased these shares, only 3.8% and 7.3%, while the scope of collected environmental taxes expressed as a share of GDP has increased from 2.95% to 3.92% in 2015 (marking a 32.9% increase). Only Serbia and Croatia documented a larger share while both Austria and Germany at 2.41% and 1.92 % fall well below this threshold.

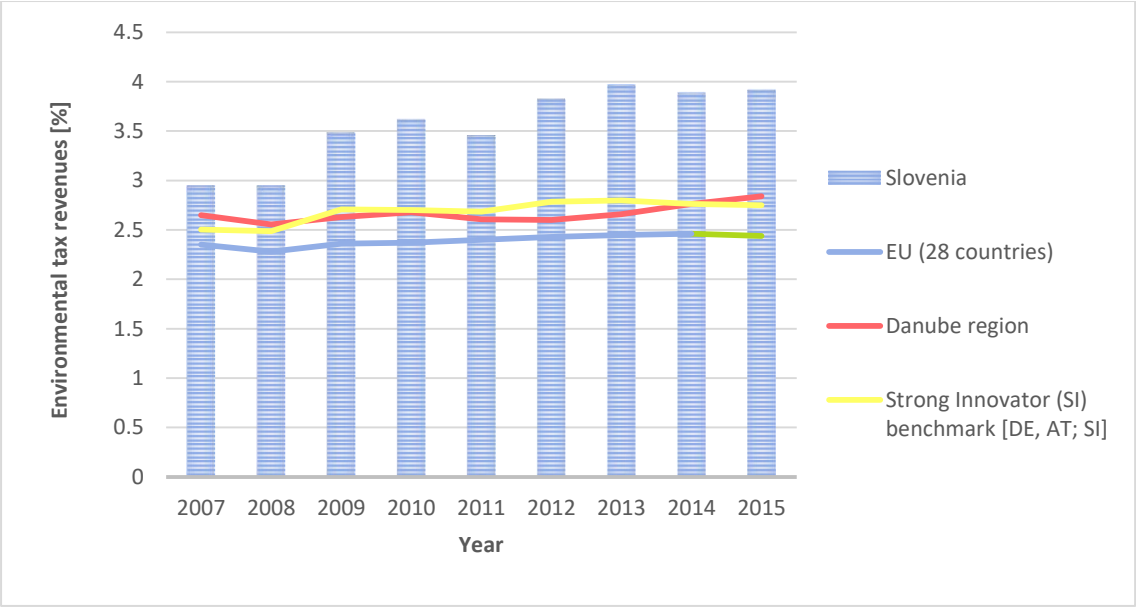


Figure 60: Environmental tax revenues (Source: Eurostat)

OPORTUNITY: A very high value of environmental tax revenues provides opportunity on several levels. Most notably, the high share of collected revenue can be used to improve upon existing areas of environmental protection (for e.g. by incentives and subsidies). In addition, taxes associated to environmental protection represent a premium to the use of energy and resources, making it more likely that environmental considerations are priced in products and services purchased within a country (for example, high contributions to own less fuel-efficient vehicles provide an advantage to vehicles with better fuel economy).

Indicator: Energy taxes (absolute and per capita)

Taxes on the production, distribution and consumption of energy are a part of the overall environmental taxes collected in a country. They include taxes on energy use paid by households, industry, construction, wholesale and retail trade of energy, agriculture, forestry and fishing, transportation and storage and as well as services economic sectors. In absolute terms, the value of taxes collected have increased in all countries from 2007 onwards. A part of the increase can be attributed to higher energy demand and consumption,

while the contribution of implementing European policy in order to achieve energy saving targets should also be considered.

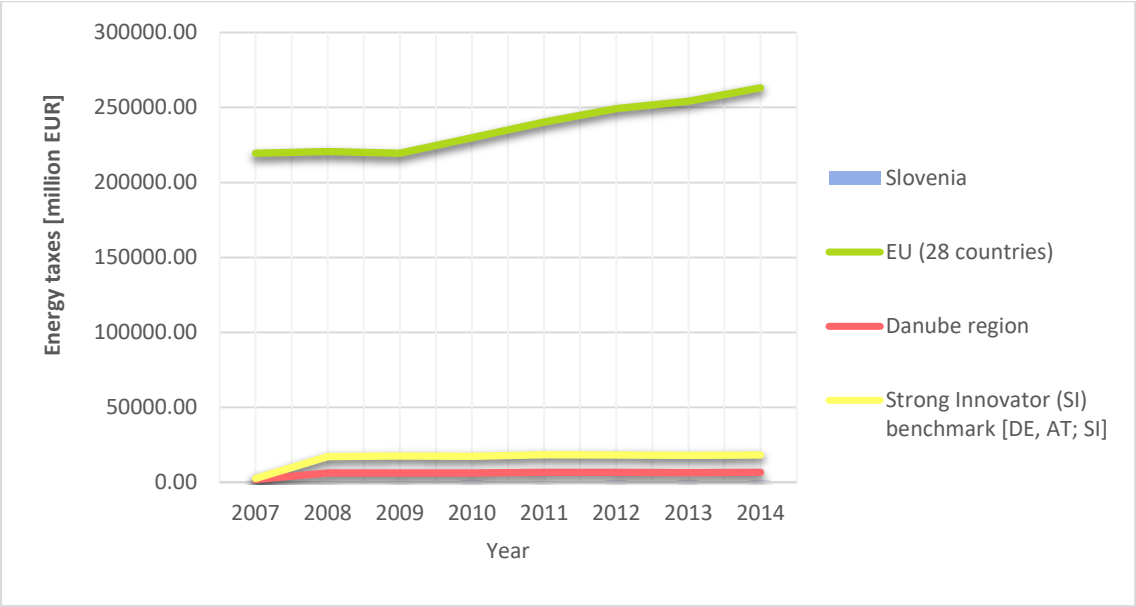


Figure 61: Energy taxes [million EUR] (Source: Eurostat)

On a per-capita basis, Slovenia surpassed both the average of the EU as well as the Danube region. In 2014, each resident contributed 1124.2 EUR of energy taxes, which is 43% more compared to 2007. In this regard Slovenia had one of the highest increased (second only to Romania), while the average of the EU and the Danube region (with reference to 2008 when data for all countries is available) was 20% and 7% respectively.

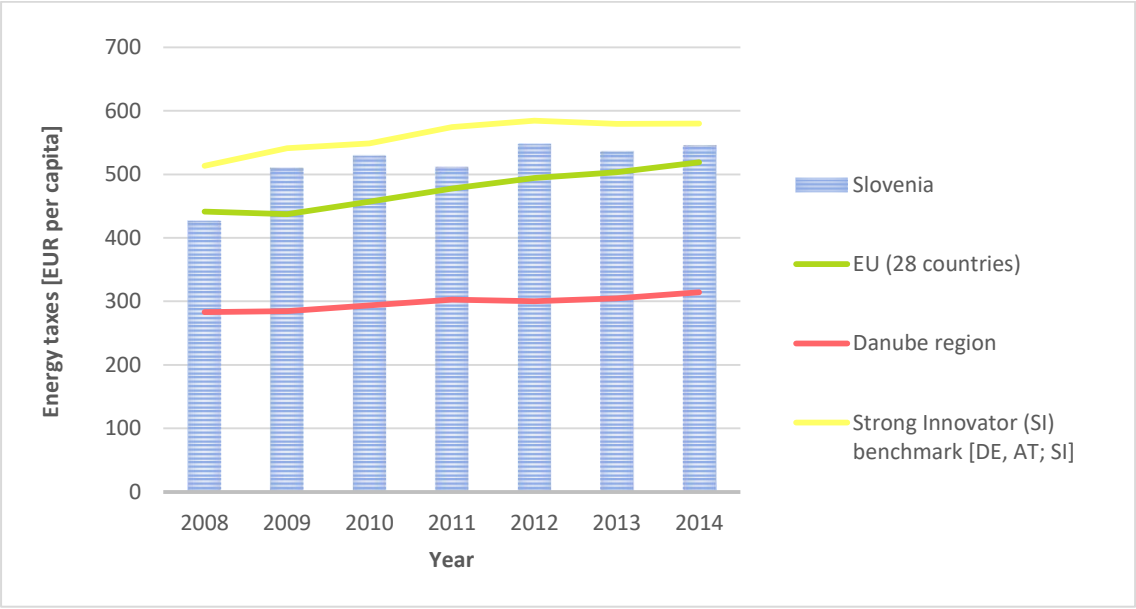


Figure 62: Energy taxes [EUR per capita] (Source: Eurostat)

OPORTUNITY: Same as in the case of overall environmental taxes, the high contributions and a strong growth

trend, Slovenia demonstrates some level of maturity in terms of pricing non-economic factors within the wholesale and retail energy prices. This demonstrates a strong opportunity of the national market to uptake eco-innovative products (such as advanced heat-pumps, vehicles with alternative fuels, etc.). A very high value of environmental tax revenues provides opportunity on several levels. Most notably, the high share of collected revenue can be used to improve upon existing areas of environmental protection (for e.g. by incentives and subsidies). In addition, taxes associated to environmental protection represent a premium to the use of energy and resources, making it more likely that environmental considerations are priced in products and services purchased within a country (for example, high contributions to own less fuel-efficient vehicles provide an advantage to vehicles with better fuel economy).

Indicator: Implicit tax rate on energy

Implicit tax rate on energy is the ratio between energy tax revenues and final energy consumption within a calendar year. Again, Slovenia demonstrated one of the highest growths (surpassed by only Romania, and Serbia) with a 37.9% increase. Therefore, in 2015, each tonne of oil equivalent was burdened by 237.04 EUR in taxes, while the European average was 233.65 EUR (up 21.2% from 2007) and that of the Danube region 155.44 EUR, with a modest 18.8% increase.

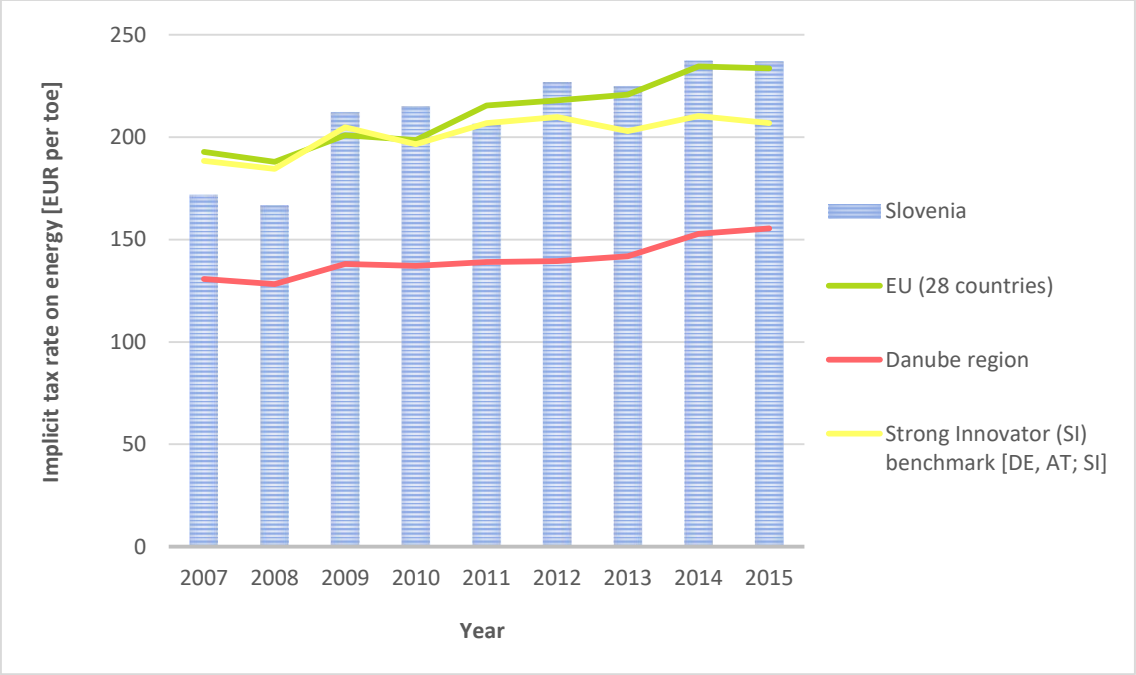


Figure 63: Implicit tax rate on energy [EUR per toe] (Source: Eurostat)

OPORTUNITY: High level of implicit energy tax supports the low-carbon energy transition by increasing the price of conventional sources of energy and offering incentives to introduce renewable energy sources. Higher prices of energy also have a positive affect on behaviour of final energy consumers and makes eco-innovative products more affordable to the general public.

5.3 ENVIRONMENTAL RESOURCES, WASTE AND RECYCLING

Indicator: Resource productivity

Resource productivity is defined as national GDP divided by DMC (domestic material consumption), which measures the total amount of materials directly used by an economy (annual quantity of raw materials extracted from the domestic territory of the focal economy in addition to all imports). Taking into account that Slovenia demonstrated the highest growth of all observed countries, with 83.9% improvement, compared to developed countries, overall resource productivity in Slovenia was still very low. Slovenia thus produced 1.49 EUR of GDP for each kilogram of resources used, while Austria was able to produce 1.67 EUR and Germany as much as 2.22 EUR. Comparatively, the average of the EU was calculated at 2.07 EUR and 1.14 EUR for the Danube region.

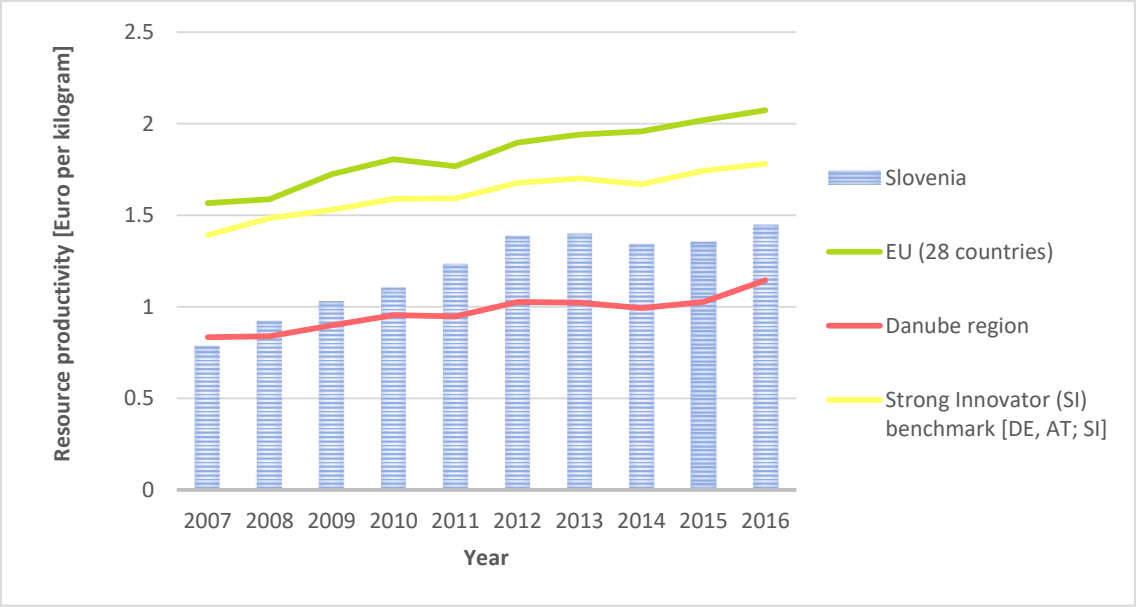


Figure 64: Resource productivity [Euro per kilogram] (Source: Eurostat)

OBSTACLE: In terms of resource productivity, Slovenia ranks well below comparably developed countries. Albeit the growth trend in the 10-year time span from 2007 was very strong, the country's economy was still about 30% less productive than the average of the EU. Considering that Slovenia is a very small country with poor resources of raw materials, it`s essential that productivity increases. The current rate of productivity is a relevant obstacle towards introducing eco-innovative products and services on a larger scale.

Indicator: Domestic material consumption

All countries except Bulgaria managed to reduce domestic material (total amount of material directly used by an economy) consumption in the 10-year time span. On average, the EU reduced domestic material consumption by more than 22%, while the Danube region as a whole reduced consumption by almost 10 %. In comparison, Slovenia reduced domestic material consumption by 46% (with reference to 2016), however has levelled out and somewhat increased once it reached its minimum of 12.19 tonnes per capita in 2013. In 2015 and 2016, Slovenia and the EU were matched on a per capita basis.

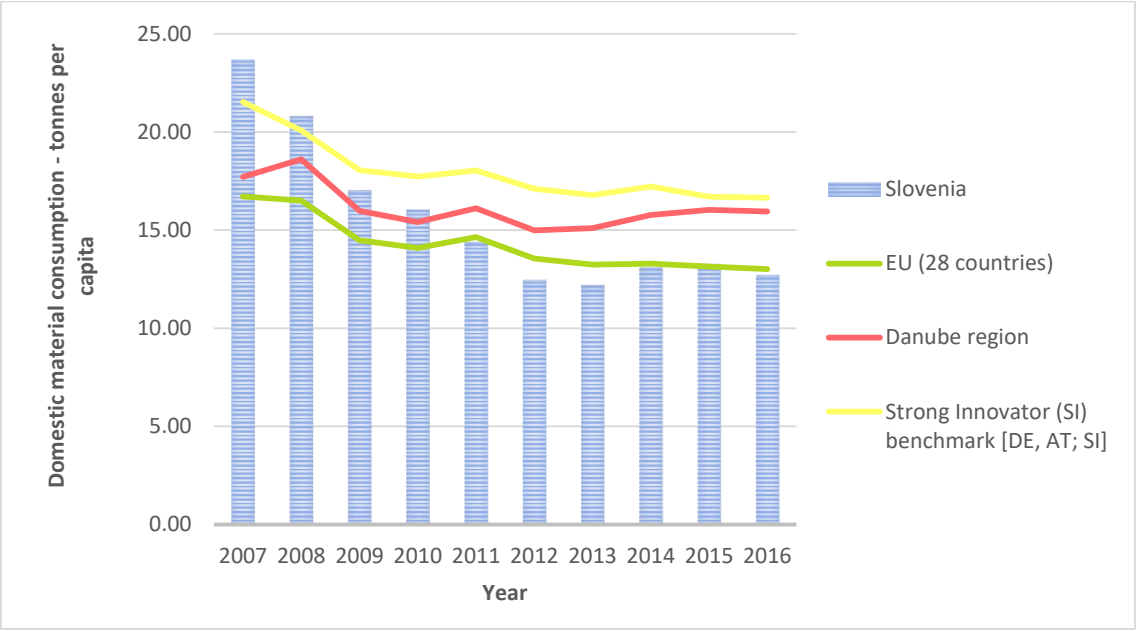


Figure 65: Domestic material consumption - tonnes per capita (Source: Eurostat)

OPORTUNITY: Comparatively low domestic material consumption is very favourable in terms of implementing circular economies and sustainable development. In part, this mitigates the dependence on raw material imports from foreign countries.

Indicator: Recycling rates for packaging waste

In terms of recycling rates of packaging waste, Slovenia substantially improved since 2007, catching up and surpassing both the EUs and Danube region's average. Slovenia increased the share by 42.8% in 10 years, from only 46.9% to 67.0%. In 2014, Slovenia reported the highest ever rate of recycling packaging waste at 70.4%. Data for several countries is unavailable prior to 2012, thus the EUs average has not been calculated while the Danube region average is approximated before this period.

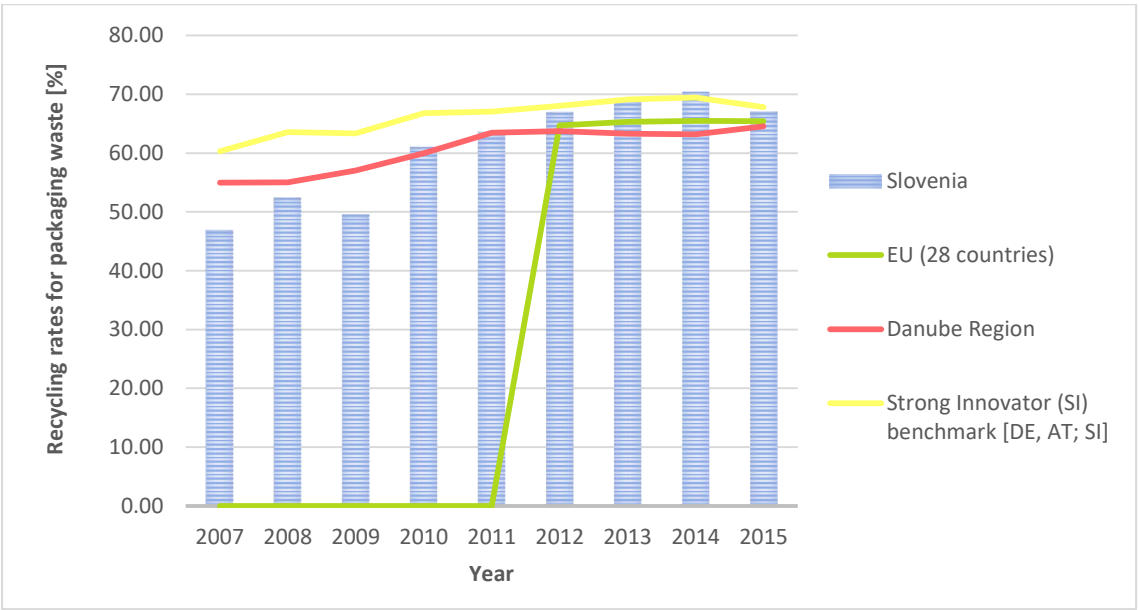


Figure 66: Recycling rates for packaging waste [%] (Source: Eurostat)

OBSTACLE/OPPORTUNITY: Comparatively, Slovenia is only slightly better than the average of the EU. However, on average the rate of recycled packaging waste within the time period was still only 60.76%, which was far too low to consider itself sustainable. However, there is a clear opportunity for any type of eco-innovation that would allow to address this issue in a sustainable manner.

Indicator: Recycling rate of municipal waste

The rate of recycling municipal waste (inclusive of material recycling as well as composting and anaerobic digestion) has also been improved across all observed countries. Slovenia increased the share of recycled municipal waste by 147%, while the average increase of the EU as well as the Danube region was evaluated at 28.6% and 34.7% respectively. In 2015, the share of recycled municipal waste reached 54.10%. Compared to Austria and Germany, Slovenia still lagged behind, but documented a far larger increase within the observed period and demonstrates a high growth (albeit no continuous and less stable compared to the SI benchmark) trend for the future.

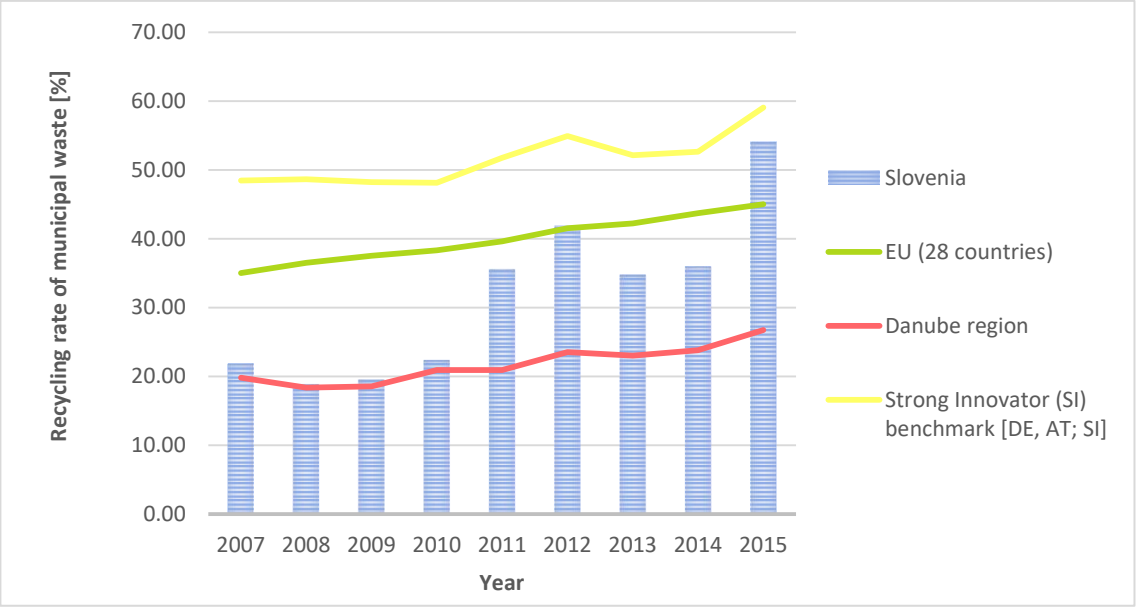


Figure 67: Recycling rate of municipal waste [%] (Source: Eurostat)

OBSTACLE/OPPORTUNITY: To a large extent, municipal waste consists of waste generated by households but may also include similar wastes generated by small businesses and public institutions. In terms of sustainable development, this share is still far too low to be considered a success. There is however a clear opportunity for any business that could provide a product or service which would help to increase the recycled rate.

Indicator: Recycling rate of e-waste

Recycling rate of electronic waste constitutes the so-called collection rate (collected volumes in relation to the average sum of electrical and electronic waste put on the market within the previous 3 years) multiplied

by the reuse and recycling rate. Slovenia has substantially improved since the reference year 2009 (no data for 2008) where the rate of recycling was only 17.6%. In 2015, the rate was calculated at 47.7%, surpassing Austria by 17%. However, the recycling rate were substantially higher in Croatia and Hungary. In terms of recycling rates of electronic waste, there is very poor data availability for the countries observed.

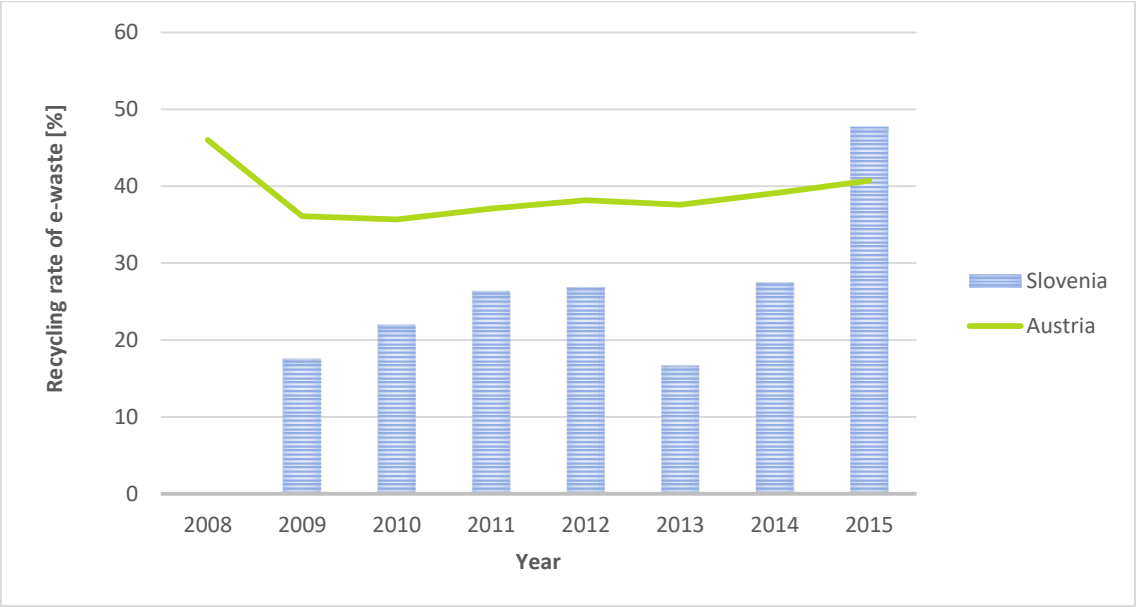


Figure 68: Recycling rate of e-waste, Slovenia compared to Austria (Source: Eurostat)

OBSTACLE/OPPORTUNITY: As in the case of recycle rates for packaging and municipal waste, still a relatively small share of waste (less than 50%) is recycled, which cannot be considered favourable in any circumstance, provided that electronic devices are built with trace amounts of very rare elements, of which Slovenia has none. Again, there is tremendous opportunity for a product/service or even method that could substantially increase the recycle rate.

5.4 ENVIRONMENTAL LEGISLATION

The legislation in the field of environmental protection is abundant and can address very specific areas or territories. For example, separate legislative acts exists for the Škocjan Caves Regional Park, The Triglav National Park and the Kozjansko natural Park.

However, the most relevant pieces of legislation imposed on the national level are the:

Environmental Protection Act (ZVO-1-NPB7, Legislative and Legal Service of the National Assembly, 11/26/2013 - Official Gazette of the Republic of Slovenia, No. 41/04, 20/06, 39/06, 70/08, 108/09, 48/12, 57/12, 92/13, 56/15, 102/15, 30/16),

Nature Conservation Act (Official Gazette of the Republic of Slovenia, No. 56/99, 31/00, 119/02, 22/03, 41/04, 96/04 and 46/14).

In addition, several acts are relevant to specific areas of environmental policy:

Water Act
(Official Gazette of the Republic of Slovenia, No. 67/02, 57/08, 57/12, 100/13, 40/14, 56/15)

The Act on the Proclamation of the Protective Ecological Zone and the Continental Shelf of the Republic of Slovenia
(Official Gazette of the Republic of Slovenia, No. 93/05)

Act on Management of Genetically Modified Organisms
(Official Gazette of the Republic of Slovenia, No. 23/05 - OFFICIAL PURPOSE OF THE WORD, 21/10)

Law on the use of assets of long-term provisions for ecological rehabilitation
(Official Gazette of the Republic of Slovenia, No. 59/01)

Law on the elimination of the consequences of natural disasters
(Official Gazette of the Republic of Slovenia, No. 114/05 - OFFICIAL TRANSLATION TEXT, 90/07, 102/07, 17/14)

Each area is further defined in detail in subordinate by-laws.

6. ECONOMY AND DEMOGRAPHY

Slovenia is one of the smallest EU countries, both in terms of its residency as well as territory. It`s organized as a parliamentary democratic republic with the prime minister and the president of the state elected in direct elections. The government is the bearer of the executive and administrative authority. Slovenia has no regions but is divided into 212 municipalities. It`s the most developed country from the former republic of Yugoslavia, from which it seceded in 1991. It then joined the European Union as well as the North Atlantic Treaty Organization in 2004 and adopted the euro in 2007. Similarly to many other country in the region, the events following the financial meltdown left the country in disarray. The debt to GDP ratio skyrocketed from merely 21.8% in 2008 to an incredible 82.6% in 2016, forcing the country to make substantial cuts in its social policy and investment in general. This was the combined impact of both high interest rates on the national debt caused by a poor credit rating and distrust from lending markets as well as a substantial decline of GDP, marking a -4.50 drop in the first quarter of 2009.
The country was pressured to privatize its holdings in companies, some infrastructure and utilities, which also came (partly) to fruition. The privatization wave was halted by an improvement of the country's finances as well as the international economy. In absolute terms, the debt peaked out at 40.119 billion EUR (or 19.448 EUR per capita) and has been reduced to about 35 billion in 2016, where it still holds today. In relative terms, the situation improved dramatically due to a very high growth of GDP for which, the main drivers are exporting companies. Currently the year-on-year GDP growth in about 4.50% and is forecasted to continue also until the end of 2018. However, in the event of new turmoil of the global economy and the financial sector (increased interest rates, economic slowdown of producers from Western Europe, oil supply and prices with regard to conflicts in the middle-east, etc.), it is likely that the country would find itself on the verge of bankruptcy in a very short time span, although high national debt has become somewhat the norm not only in Europe but worldwide.

Despite many challenges brought about with the altered global conditions, in addition to the challenges that are inherit to small countries, Slovenia still holds up a very high standard of living. The country has very good infrastructure, a well-educated work force, a strategic location between the Balkans and Western Europe, and one of Central Europe's highest per capita GDPs.

The main issue going forward are very unfavourable demographics. Due to fewer births than in the past and prolonging the life expectancy, country is faced with an aging population that will be more intensive than demographic projections in Slovenia than in the EU average. The increase in the share of the population over 65 years of age has a significant impact on the increase in expenditure on pensions, health care, long-term care and other aging related expenditure, where Slovenia will significantly differ in the future compared to other EU countries. The aging of the population will also require changes in the area of social protection, employment and policy responses in many other areas, such as, for example, adaptation of the environment and services to the elderly.

6.1 GROSS DOMESTIC PRODUCT (GDP)

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

Economic activity measured as the volume index of GDP per capita in purchasing power standards shows that Slovenia is on average only 84% that of the EU and nearly 25% lower compared to the SI benchmark. Moreover, GDP in PPS per capita is more than 30% lower (22.490 EUR versus 35.800 EUR) than in Germany and almost 35% lower (34.270 EUR) compared to Austria. The chart indicates that Slovenia was not able to maintain the pace of the EU, which has grown 11.5% within the observed 10 years, while Slovenia only managed to increase the GDP in PPS per capita for about 7.5%. The Danube region on average has managed a 20.5% increase, almost reaching parity with Slovenia in 2016 (20.125 EUR vs. 22.490 EUR) compared to 2007 when the divide between Slovenia and the region was close to 20%.

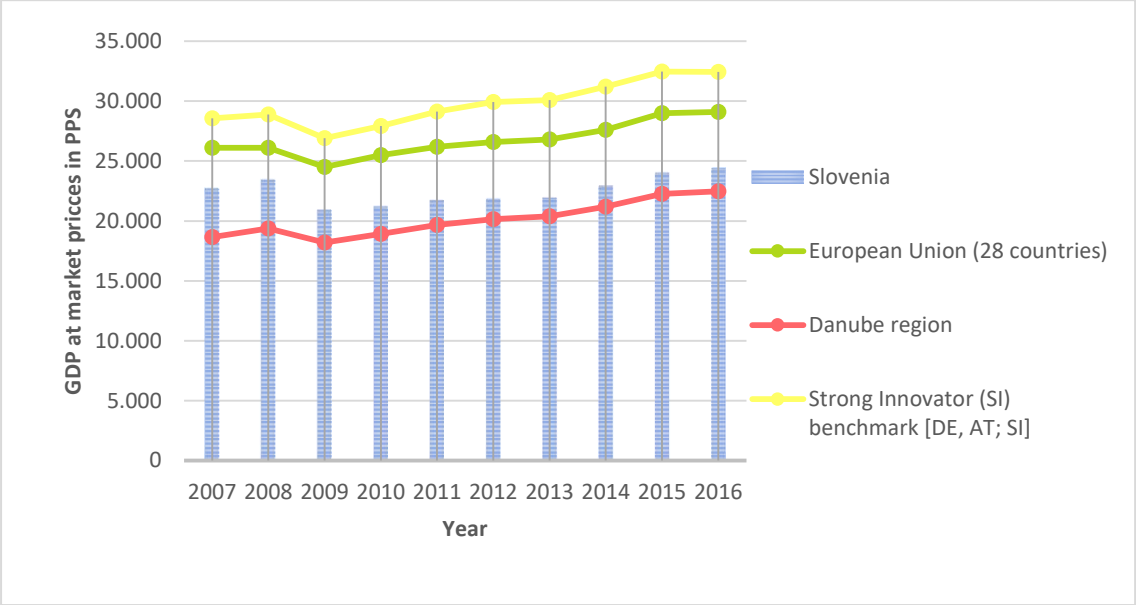


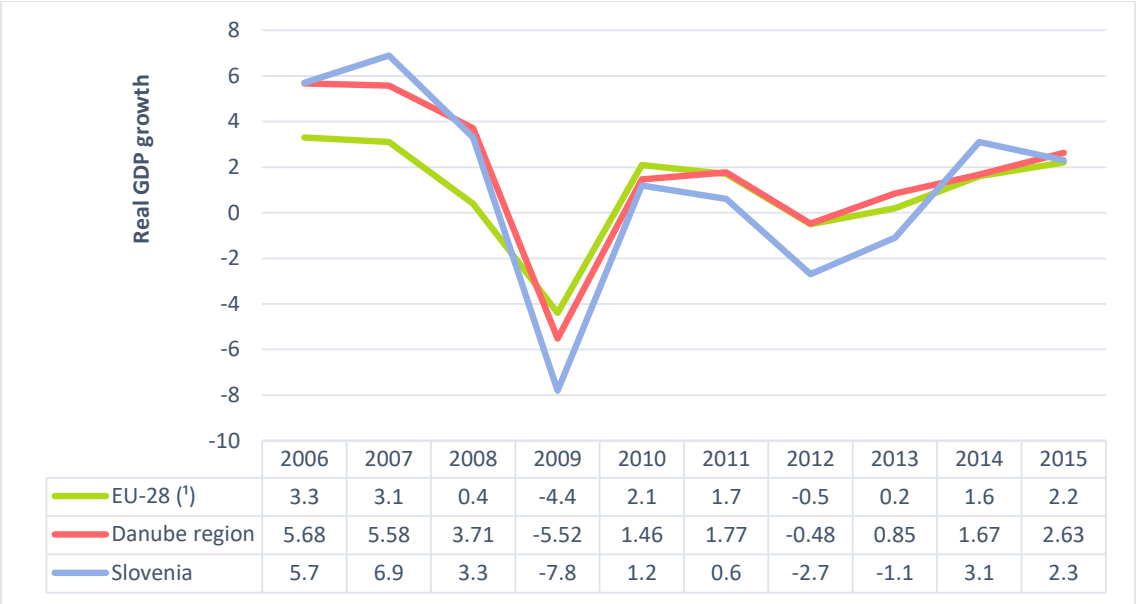
Figure 69: Gross domestic product at market prices in PPS per capita in Slovenia, the EU and the Danube region (Source: Eurostat)

OBSTACLE: The sluggish growth of Slovenia compared to the EU as well as the Danube region indicates a stagnation of living standards of its residents, which has negative influence on social cohesion. There is a clear need to support industry providing high added value instead of low-skill, high intensity positions that in the end contribute greatly to GDP growth, but do very little to improve the life of people. A very low increase of the GDP in PPS per capita also indicates that there is less money collected through taxes, putting additional pressure on the national budget and financing of science, education, research and development.

Indicator: Real GDP growth

The chart indicates that Slovenia suffered a loss of GDP greater to the average of the EU as well as the Danube region. In 2009, Slovenia suffered a drop of almost 8% and has not recovered in the observed time period. However, in 2017 GDB growth has experienced robust growth throughout 2017, when it reached 4.5% already in the third quarter. The improved economic circumstances across Europe has boosted exports while

increased consumer optimism facilitated higher domestic spending.



	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
Slovenia	5.7	6.9	3.3	-7.8	1.2	0.6	-2.7	-1.1	3.1	2.3

Figure 70: Gross domestic product at market prices relative growth per annum (Source: Eurostat)

OBSTACLE: Although growth has picked up in the last years, high volatility of GDP compared to the EU as well as the Danube region indicates a systematic and structural problem of the national Economy. More efforts must be made in supporting industry than is not as vulnerable to international market swings, for e.g. the suppliers of the automotive industry**.**

6.2 LABOUR MARKET

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

As indicated by the volatile movements of the national GDP, employment as such also indicates to a structural problem of the national economy. While the 2008 financial crisis was more or less shrugged off by both, Austria and Germany (leading only to a stagnation on the employment rate), employment in Slovenia fell off a cliff post 2008. Falling from a peak value of 73% in 2008, it fell to only 67.2% in 2013. Considering that the employment rate of Slovenia exceeded that of both the EU and the Danube region by about 3.7% and 6% respectively, the trend indicated in the chart is not favourable. Slovenia fell behind the Danube region average since 2013 and has not exceeded the region employment rate ever since.

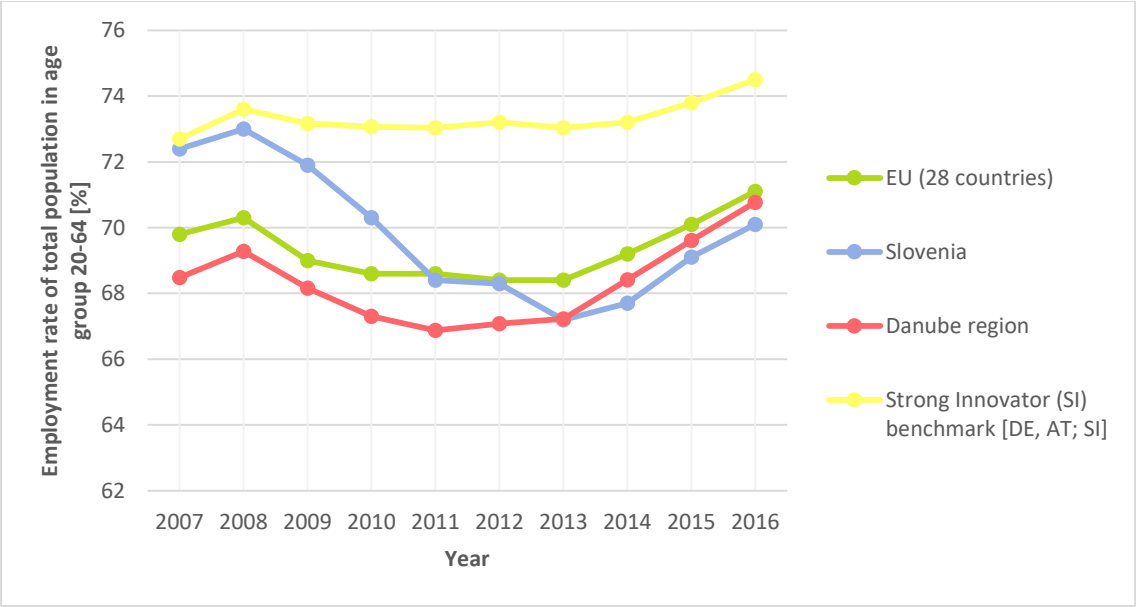


Figure 71: Employment rate as a share of population age 20-64 in Slovenia (Source: Eurostat)

OBSTACLE: The employment rate of Slovenia within the observed period paints a grim picture of the national economy. The low employment rate coupled with low remuneration and poor social mobility is one of the key reasons for brain drain of highly-educated, talented people, which can`t find gainful employment at home. The long-term impact of such a trend is a spiral of downsizing, negative selection and continuation of the inverted population pyramid.

Indicator: Unemployment rate as a share of active population

The unemployment rate as a share of active population in Slovenia confirms the trend observed in the previous charts, albeit less explicit. The unemployment rate metric of Slovenia shows volatility that is in sharp contrast with more stable changes in both the EU and the Danube region. The unemployment rate has increased from a minimum of 4.4% in 2008 to a 10.10% in 2013. It has since declined to 8% in 2016 and continued the positive trend also in 2017. However, keeping in mind that following the aftermath of the financial crisis a large number of citizens moved abroad and have not been kept in the official unemployment records.

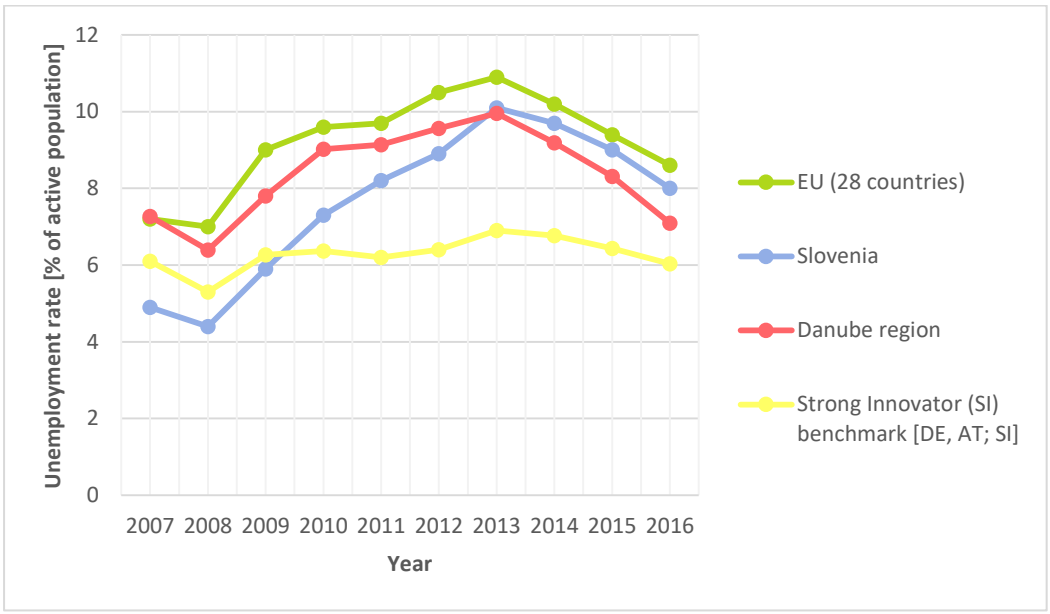


Figure 72: Unemployment rate as a share of active population in Slovenia (Source: Eurostat)

OBSTACLE: The unemployment rate as a percentage of the labour force in Slovenia was still at high levels in 2016. From all countries observed Slovenia saw the largest relative increase in unemployment in the 10-year period. Unemployment in Slovenia increased by an incredible 63.3%, compared to the Danube region, which actually documented a 2.4% decrease in unemployment. This illustrates that the labour market in Slovenia is not flexible and is not organized properly, as well as the fact that even tertiary education does not provide students with a sufficient scope of relevant skills that are highly sought in the country.

Indicator: Total long-term unemployment rate as a share of active population

The indicator portrays the share of unemployed persons since 12 months or more in the total active population, where the exact same trend as observed in previous chart is evident. Slovenia has gone from one of the lowest shares of long-term unemployment (surpassed only by Austria in 2007) to falling behind both the average of the Danube region and the European Union. In 2016, the unemployment rate was 4.7%, which was one of the highest documented and above both the EU and the Danube region. Austria documented a rate of only 1.7% and Germany 2.0%.

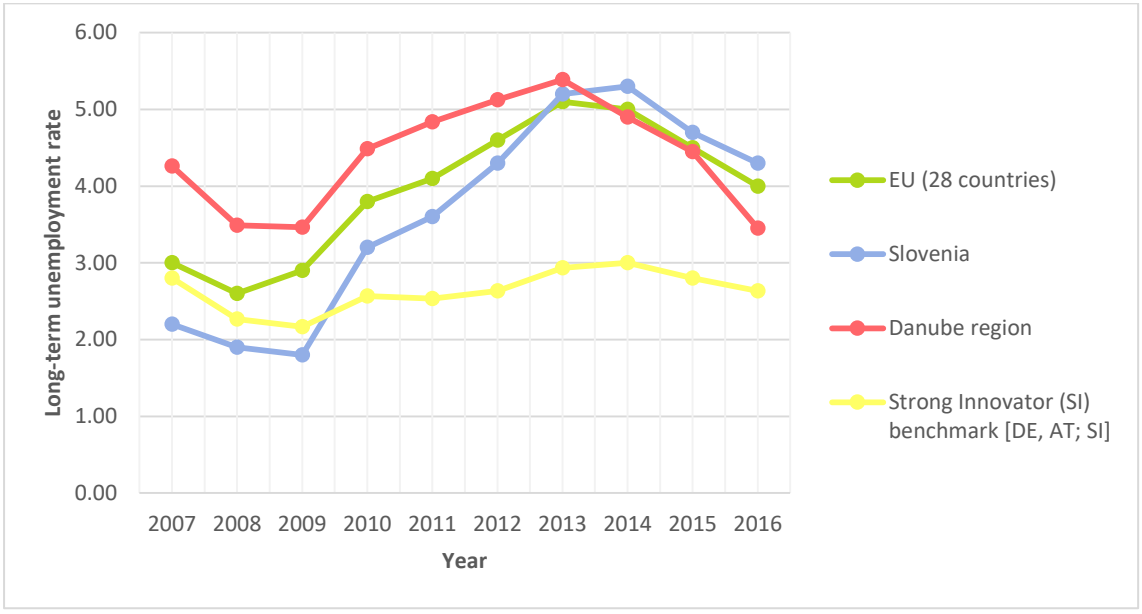


Figure 73: Long-term unemployment rate as a share of active population in Slovenia (Source: Eurostat)

OBSTACLE: The long-term unemployment rate in 2016 was one of the highest of all observed countries. Long-term unemployment indicates that the duration of an average job search within this group is more than 1 year, which clearly indicates a lack of opportunity for gainful employment. There is an evident need to update the policy of the labour market and policy in the field of employment taxes. Measures in the area of attracting investment of industry with high value added, as opposed to promoting low-skill, high-intensity job positions will be essential in the following decade.

Indicator: Youth unemployment

In 2016 (as well as in 2017) the youth unemployment has dropped substantially. This includes the total number of unemployed persons (without work, have been actively seeking employment in the past 4 weeks or had already found work that they will start in the period of the next 3 months) in the age bracket from 15 to 24. Slovenia has documented a much lower share of youth unemployment compared to the average of the Danube region and the EU, however, has once again failed to reach Austria and especially Germany, which documented a youth unemployment rate of only 6.4% in August 2017.

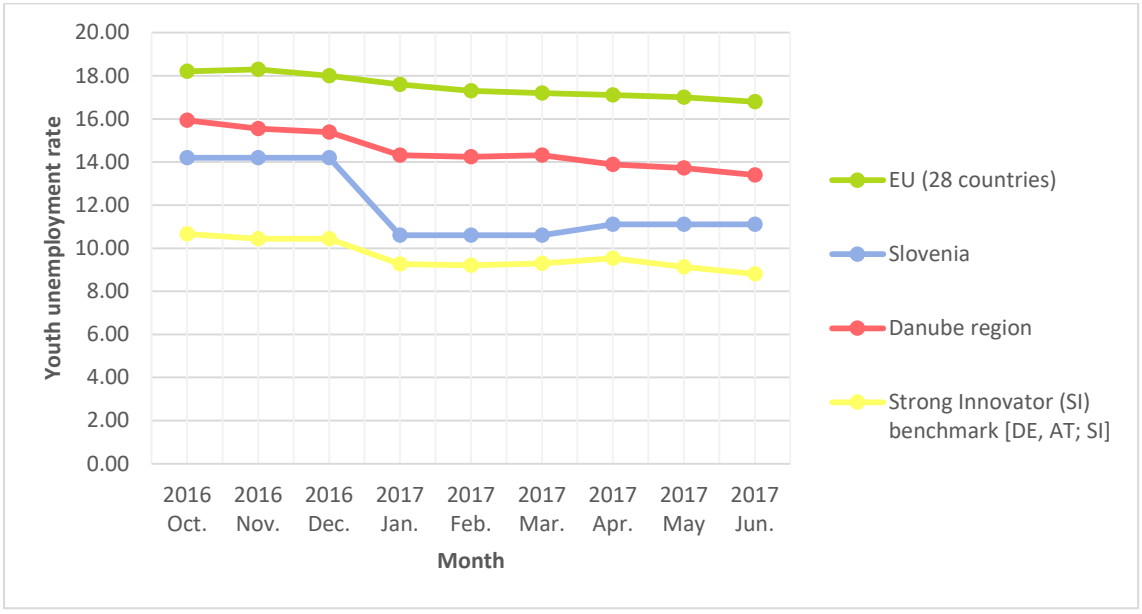


Figure 74: Harmonised unemployment rate of the age group 15-24 as a share of active population in Slovenia (Source: Eurostat)

OBSTACLE: The economic outlook on the national level has been substantially improved in the last few years, therefore in general it`s much easy (especially for first time job seekers) to find an open position, which is in itself very important for the future development of this segment of the work force. However, the fact remains that Slovenia is very vulnerable to external economic circumstances, therefore youth unemployment rate of 11.10 (June 2017) midst one of the economic conjunctures in recorded history is not in any case a good result. However, the metric is somewhat deceiving, as most persons do not finish their formal education at the age of 15.

Indicator: Combined labour cost per unit

Combined labour cost per unit (hourly rate) in Slovenia, has been almost stagnant in the observed time period from 2012 onwards. While the labour cost increased in the Danube region by 10% and even 6.3% in the EU, Slovenia managed to achieve an increase of only 3.8% (one of the lowest documented). This may indicate that the robust economic growth experienced in the last years if more a result of low-cost, high-intensity labour for (mostly) foreign industries instead of increased activity in high-tech industries.

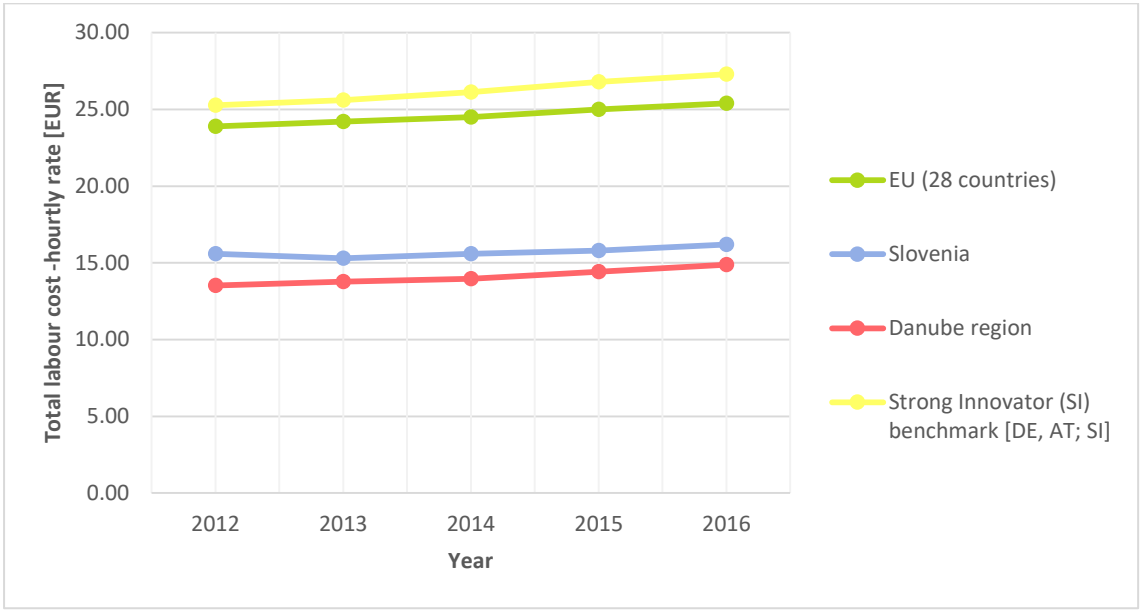


Figure 75: Combined labour cost per unit (annual data) in Slovenia (Source: Eurostat)

OBSTACLE/OPPORTUNITY: The economic outlook on the national level has been substantially improved in the last few years, therefore in general it`s much easy (especially for first time job seekers) to find an open position, which is in itself very important for the future development of this segment of the work force. However, the fact remains that Slovenia is very vulnerable to external economic circumstances, therefore youth unemployment rate of 11.10 (June 2017) midst one of the economic conjunctures in recorded history is not in any case a good result. However, the metric doesn`t include the fact that most persons do not finish their formal education at the age of 15.

Indicator: Job vacancy rate (JVR)

The job vacancy rate indicates the number of job vacancies relative to the total number of occupied posts). In this respect, the situation in Slovenia was substantially improved from the low of a 1% rate observed in 2014. From the end of 2016 until the beginning of 2017 Slovenia surpassed both the EU as well as the Danube region and has come close to rates documented in Austria (2.6%) and Germany (2.7%) in terms of job vacancies in the second quarter of 2017.

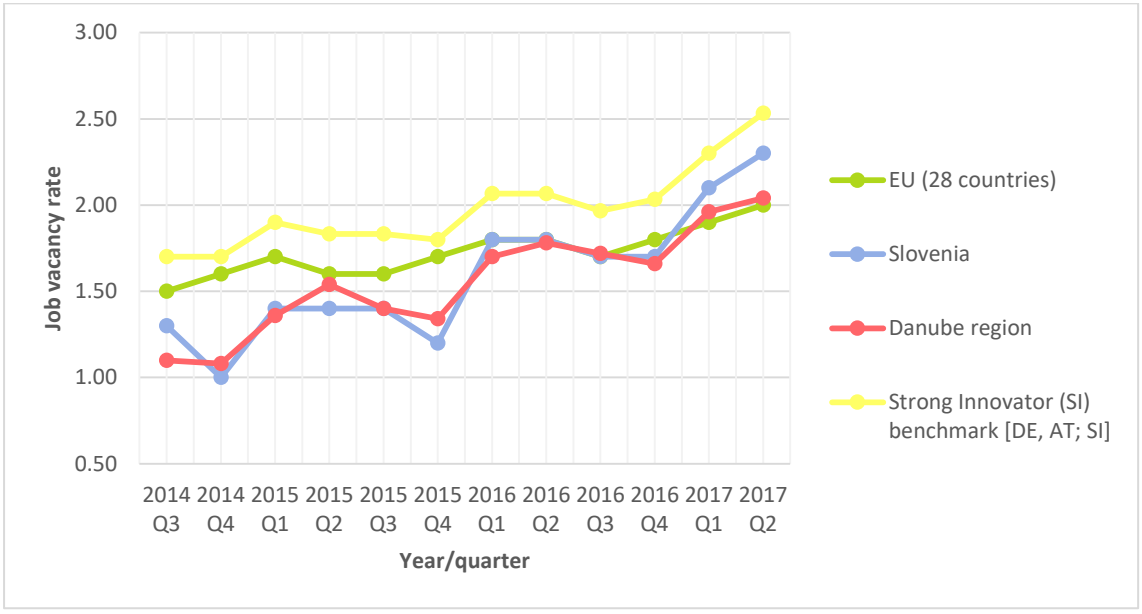


Figure 76: Job vacancy rate (JVR) in Slovenia (Source: Eurostat)

OBSTACLE/OPPORTUNITY: The JVR rate indicates that the number of job vacancies is comparable to that of more developed countries. However, JVR doesn`t provide any information about the quality of said jobs and includes positions that are interesting only to low-cost migrant workers (short-term employment in automotive production facilities).

Indicator: Minimum wage

The Slovenian gross (before deduction of income tax and social security contributions) minimum wage in 2015 was 790.73 EUR, which is an 51,5 % increase compared to 2007. The labour markets are not absolutely comparable across member states, however, amongst the countries also reporting a very high increase of the minimum wage are also Bulgaria, Romania and Slovakia.

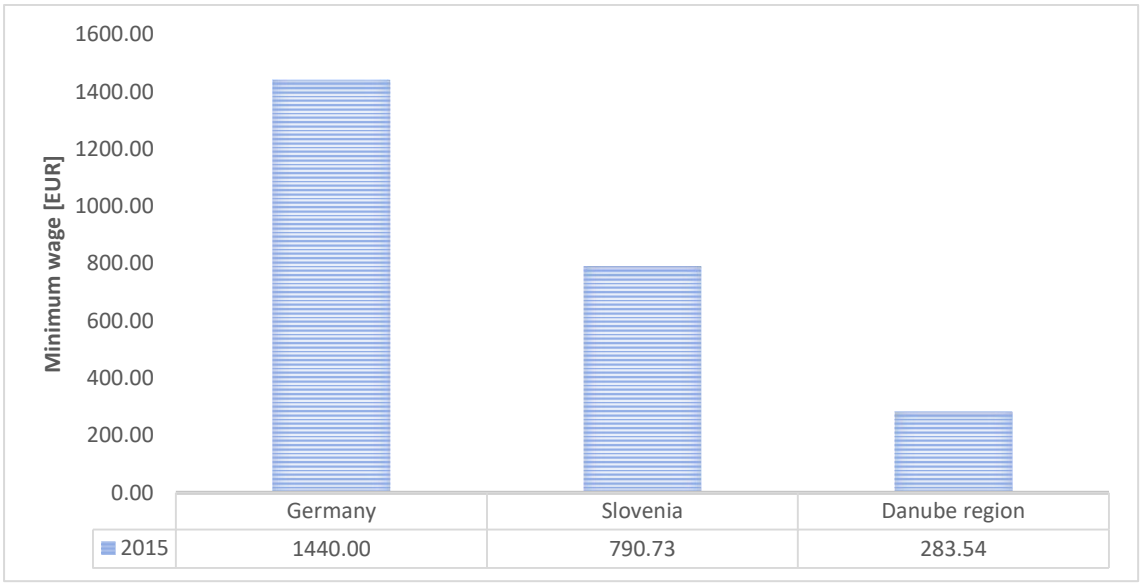


Figure 77: Minimum wage in 2015 in Slovenia compared to Germany and the DR (Source: Eurostat)

OBSTACLE/OPPORTUNITY: A shift from high-intensity towards industry with high-added value requires adequate remuneration of the workforce. It also effective in slowing brain drain, as an increase of minimum wages also tend to forerun increases of higher payed positions. In this regard the increase of minimum wage is necessary, especially in the context of ever increasing living prices. The Slovenian minimum wage in 2015 was 278.9 % higher than the average of the Danube region, but still well below the minimum wage of Germany, which makes the country attractive for western industry in terms of price-performance ratios.

Indicator: Labour productivity per hour worked (ESA 2010)

Labour productivity per hour worked signifies actual economic output (deflated GDP measured in chain-linked volumes for the reference year of 2010) per unit of labour input (total number of hours worked). The indicator displays a derogatory development of the actual productivity of the national economy with reference to the pre-crisis levels. The countries productivity was reduced from an index value (2010 reference) of 103.8 in 2007 to 95.1 in 2009. It has managed only slightly to improve productivity until 2016 achieving an index value of 106.3. Compared to the countries within the Danube region, who`s productivity has soared in the same period, Slovenia has stagnated at about the same level as more developed EU countries.

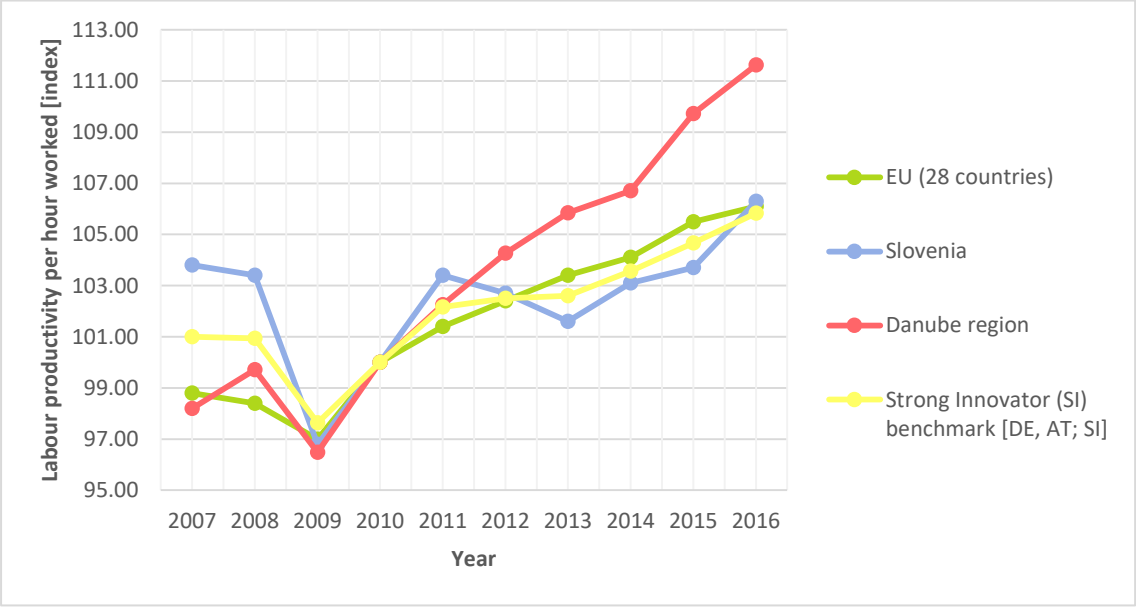


Figure 78: Labour productivity per hour worked in Slovenia (Source: Eurostat)

OBSTACLE/OPPORTUNITY: Labour productivity in Slovenia is at a comparatively low level. Taking into account the development of national economies it`s clear that Slovenia`s labour productivity should reach a level from 107 to 109 in 2016, which it has failed to do. There is a clear need to increase the labour productivity on the national level, preferably by a large-scale investment in for e.g. infrastructure and efficient production means of the national industry.

6.3 BUSINESS ENVIRONMENT

Indicator: Industrial confidence

Industrial confidence is measured by means of business survey, which indicate a very high level of confidence of national enterprises in terms of their past and future performance. Industrial confidence have outpaced that of the EU as well as the Danube region. However, once again the data illustrates relatively high volatility of the index compared to other observed countries.

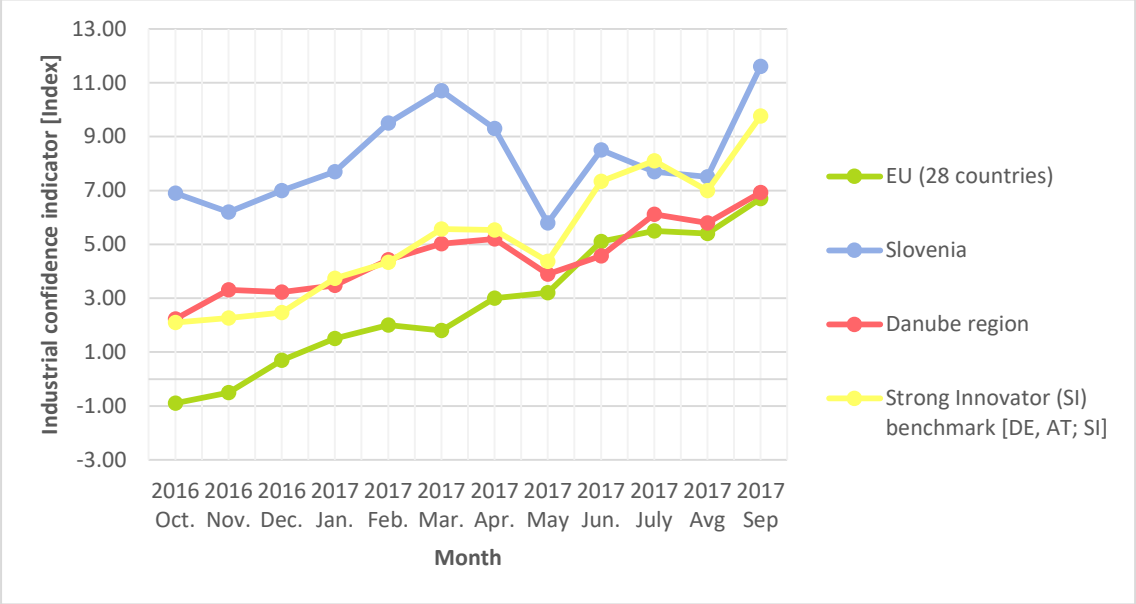


Figure 79: Industrial confidence in Slovenia (Source: European Commission - Directorate general for economic and financial affairs (DG ECFIN))

OPPORTUNITY: Industrial confidence in Slovenia has been on a very high level within the observed period, which indicates positive future development of national enterprise in the future, from the point of equity holders (business owners) and management.

Indicator: Services confidence

Confidence in the service sector has been similarly to industry confidence throughout the late 2016 to mid-2017, on a very high level. The value of the index is comparable to that of highly developed countries like Germany and Austria.

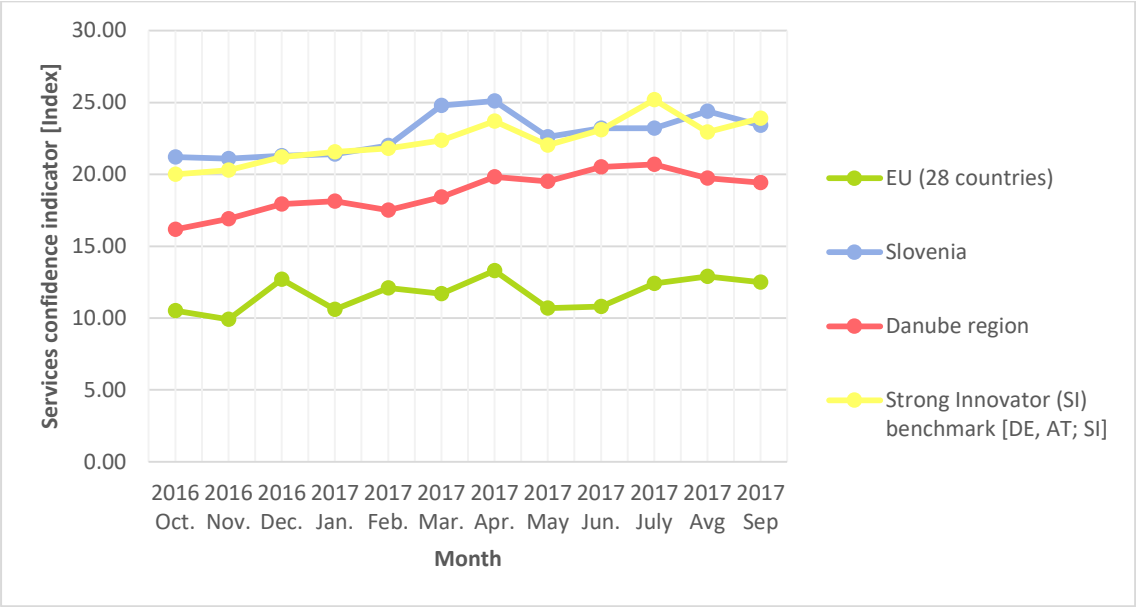


Figure 80: Services confidence in Slovenia (Source: European Commission - Directorate general for economic and financial affairs (DG ECFIN))

OPPORTUNITY: Confidence in the service sector of Slovenia has been on a very high level within the observed period, which is essential in the context of the importance of the service sector as one of the key drivers of future economic growth. The national service sector is in a large part fuelled by increased domestic spending.

Indicator: Economic sentiment

Besides industrial confidence and service sector confidence the composite indicator measuring general economic sentiment also includes consumer confidence, construction sector confidence and retail trade confidence indicators. In 2016 and 2017, national economic sentiment has substantially increased and more or less followed the trend observed elsewhere in Europe.

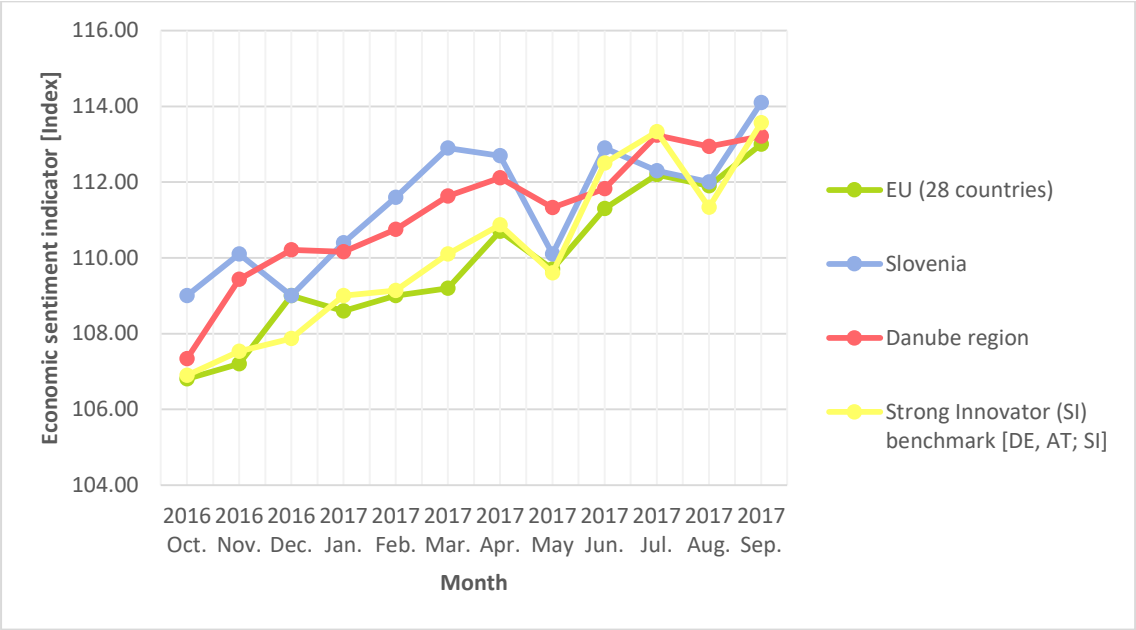


Figure 81: Economic sentiment in Slovenia, Europe and the Danube region

OPPORTUNITY: Economic sentiment has increased from an index value of 109.0 to 114.1 within 1 year, re-affirming the positive outlook of the European and global economy.

Indicator: Real effective exchange rate

The real effective exchange rate is a relative price and cost indicator, that portrays a countries price/cost competitiveness relative to its principal competitors in international markets. The index illustrates that Slovenia has very closely followed the level of cost competitiveness compared to the SI benchmark, despite a much lower level of for e.g. production means of its industry (compared to Austria and Germany).

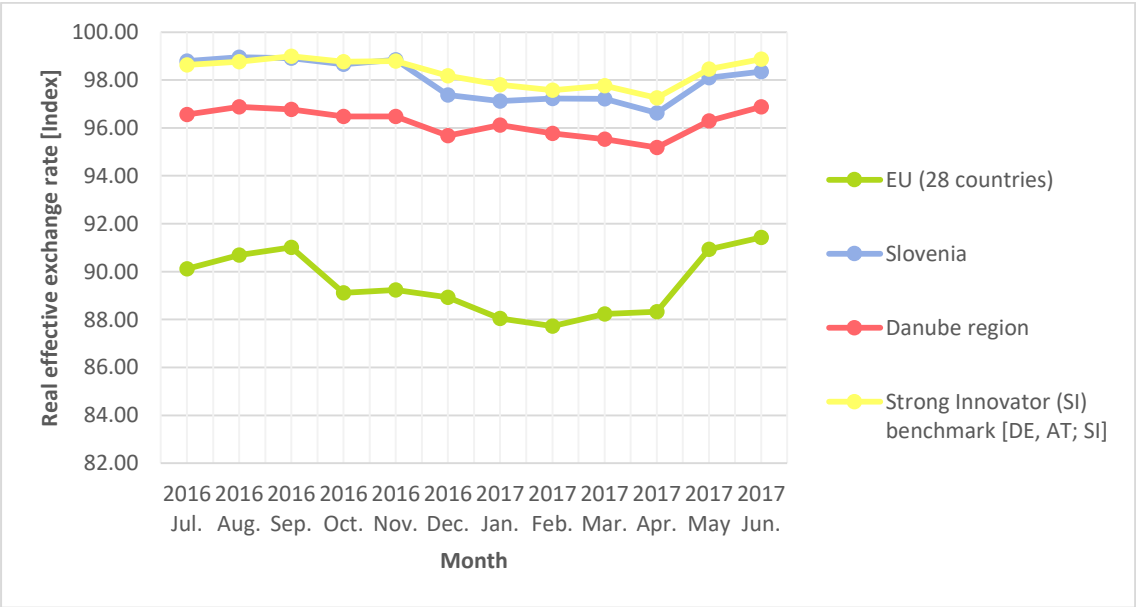


Figure 82: Real effective exchange rate (42 trading partners) in Slovenia, Europe and the Danube region (Source: Eurostat)

OPPORTUNITY: The competitiveness of Slovenia in 2016 and 2017 was despite its shortcomings at a very high level. It surpassed both the Danube region as well as the EU.

Indicator: Corruption perception index

The corruption perception index (CPI) indicates the perceived level of corruption within countries public sector institutions. Compared to Austria and Germany, who in 2015 reached 76 points (up 10.14% from 2012) and 81 points (up 2.53 %) respectively, the public sector in Slovenia is perceived slightly less corrupt than the average country from the Danube region. The public sector of Slovenia (rated at 60 points in 2015) was also perceived slightly more corrupt in 2015 compared to 2012 (-1.64%).

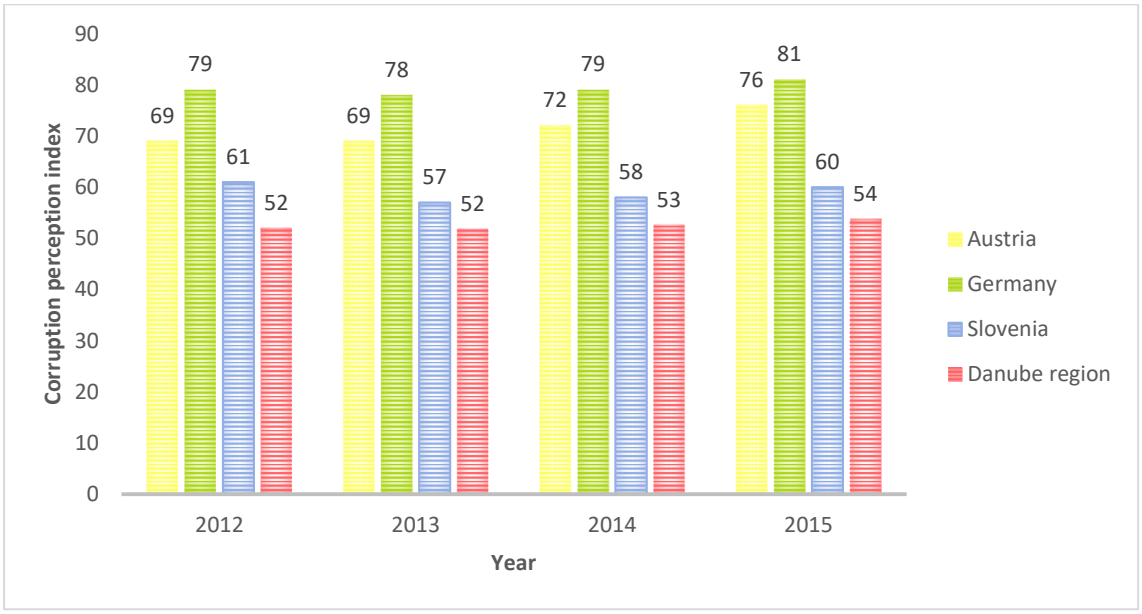


Figure 83: Corruption perception index in Slovenia, Austria, Germany and the Danube region (Source: Transparency International)

OBSTACLE: Perceived corruption in Slovenia is at a much higher level compared to more developed countries from central and Western Europe. The problem is emblematic for most countries from the Eastern block and ex-Yugoslavia in particular. There is an evident need to upgrade and enforce policies for mitigating economic (white-collar) crime that has run rampant, in particular before the onset of the financial crisis of 2008, or at least improve public relation communication.

6.4 TAXES

Indicator: Effective average tax rates

Effective average tax rates (of the non-financial sector) in Slovenia are on the lower end of the spectrum compared to other EU countries, particularly those with a similar level of economic development and have declined within the observed 10-year period from 2007 onward. Compared to Austria and Germany, which documented an effective average tax rate of 23.1% and 28.2% in 2016, Slovenia at 15.5% was substantially lower.

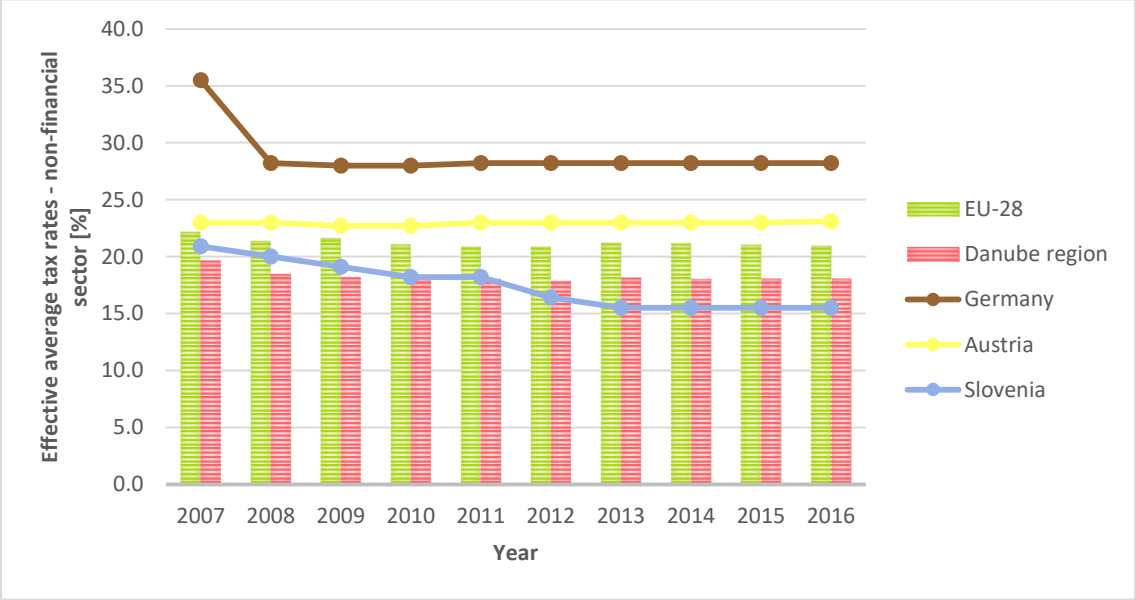


Figure 84: Effective average tax rates in Slovenia, Austria, Germany and the Danube region (Source: European Commission, Taxation and Customs Union)

OPPORTUNITY: Contrary to the perception of the general public in Slovenia, the country has a comparatively low effective average tax rate (excluding the financial sector) in relation to other countries at a similar stage of development. There is sufficient room to raise the effective average tax rate, however, the publics distrust towards the governmental availability to spend rationally collected funds makes this impossible to implement from a political perspective, even though the countries with whom the citizens would like to compare to all have substantially higher tax rates.

Indicator: Taxes on capital as a share of GDP

Taxes on capital as a share of gross domestic product are also comparatively low against most countries observed within this analysis. In 2015, this share was only 3.9%, while Austria documented 7.4% and Germany 6.3%. The taxes on capital relative to the GDP were also substantially lower in Slovenia compared to the Danube region average (5.2% in 2015).

Figure 85: Taxes on capital as % of GDP in Slovenia, Austria, Germany and the Danube region (Source: European Commission, Taxation and Customs Union)

OPPORTUNITY: Compared to the rest of Europe, taxes on capital relative to a countries GDP are at a low level in Slovenia. This increases the possibility of attracting meaningful investment into the country and can provide some maneuver space if there should be a requirement to increases fiscal funds for the governmental budget.

Indicator: Taxes on labour as a share of GDP

Taxes on labour relative to the national GDP are contrarily to taxes on capital at a high-level. Particularly within the income/tax bracket of highly educated workers, the national tax policy is uncompetitive with other developed countries. Exceeding 20,400 EUR of gross annual income already puts a worker into the 3rd income/tax bracket with an effective tax rate of 34%, while more than 70,907 EUR foresees a 50% effective taxation.

Figure 86: Taxes on labour as % of GDP in Slovenia, Austria, Germany and the Danube region (Source: European Commission, Taxation and Customs Union)

OBSTACLE: Relatively high taxes on labour has a detrimental effect on the national labour market, particularly for wage earners in higher income brackets. Since the thresholds are set very low, this means that engineers, researchers and other highly-educated personnel with marketable skills are unable to find gainful employment that would suit their level of knowledge, responsibility and expertise. There is an evident need to reduce taxes on labour and substitute them with other, less productive tax areas (for e.g. taxes on capital).

6.5 EDUCATION

Indicator: Expenditure on education as a share of GDP

Expenditure on education as a share of GDP was at a very high level from 2002-2011, surpassing the average of the EU, the Danube region and Germany. Only Austria allocated a higher share of GDP for education in 2011.

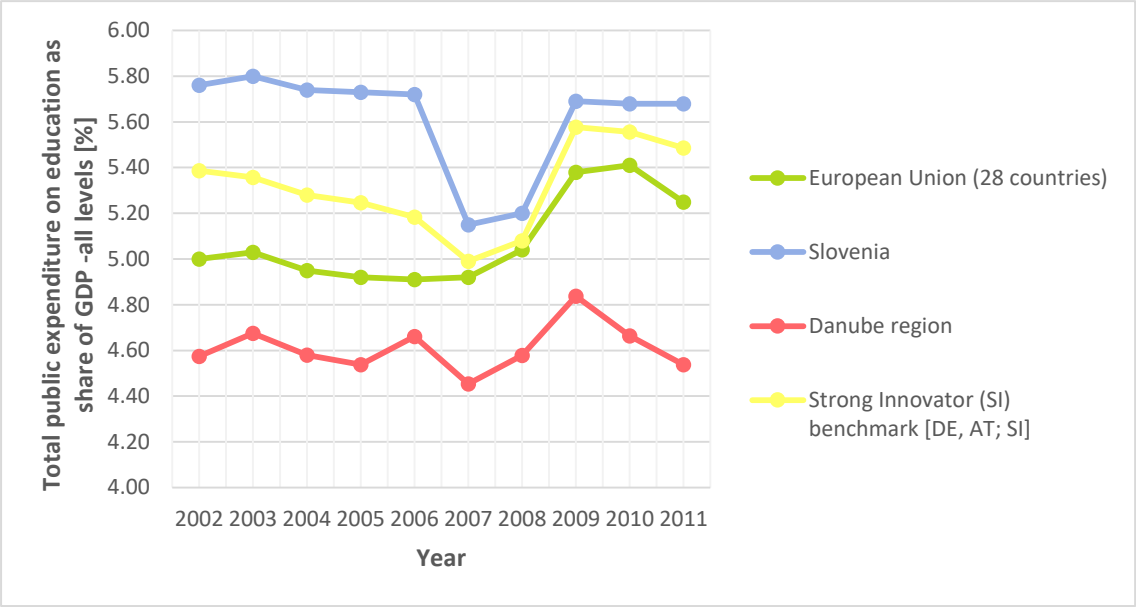


Figure 87: Expenditure on education as a share of GDP in Slovenia, the EU and the Danube region (Source: Eurostat)

OPPORTUNITY/OBSTACLE: Substantial spending on education is an essential prerequisite to bring about a knowledge society of skilled and informed workers/citizens. However, it`s clear that the national fiscal policy and policy on education are not in tune. In particular, for the tertiary level of education, Slovenia is spending large amounts of funds to educate workers that are unable to find gainful employment that would match their intellectual capability and expectations. Therefore, in essence Slovenia is spending a non-negligible amount to educate workers for more developed countries within Western Europe, which receives this skilled workforce free of charge. The educational system must be adapted to service the needs of the national economy and discontinue studies for which the economy has no use. At the same time, the notion of free of education should be re-examined in the sense that, if there is an opened position for personnel educated by tax payer funds, that it should be mandatory for those workers/recipients to work at least a certain period of time in the sponsoring country, or otherwise return the funds allocated for their study.

Indicator: Total public expenditure on education (tertiary level) as a share of GDP

Total public expenditure on education at the tertiary level relative to the GDP was in Slovenia one of the highest from all observed countries, taking second place only to Germany, which allocated 1.4% GDP for this purpose.

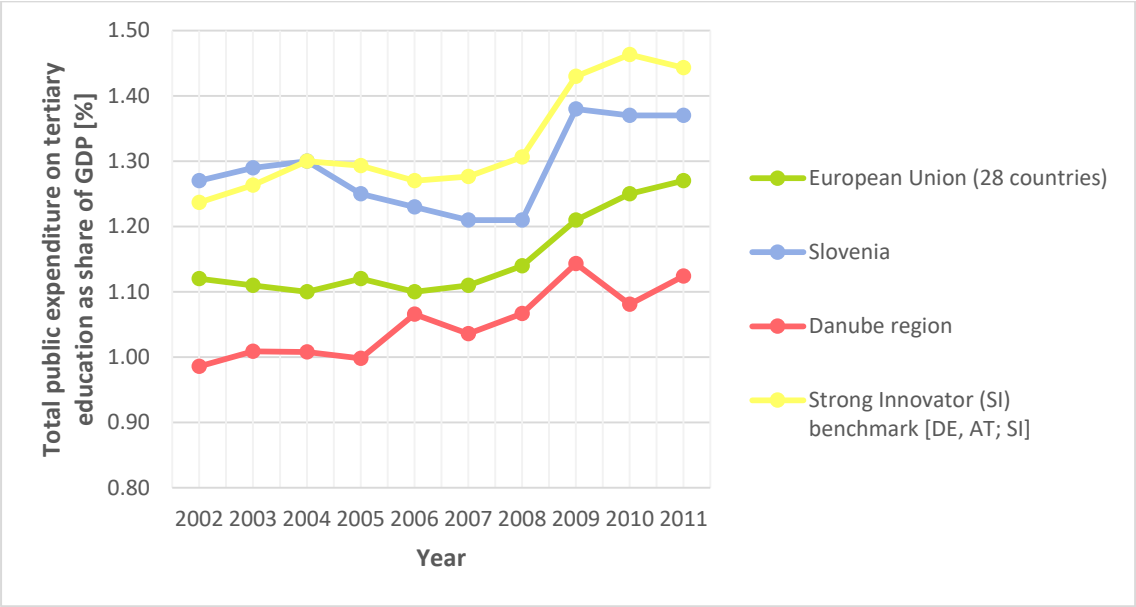


Figure 88: Expenditure on tertiary education as a share of GDP in Slovenia, the EU and the Danube region (Source: Eurostat)

OPPORTUNITY/OBSTACLE: National fiscal policy and policy on education are conflicting in the area of tertiary education. The programmes of tertiary education should be adapted to actual requirements of the national economy, putting an emphasis on science and engineering topics as opposed to human studies. In general, the quantity of tertiary level graduates is too high and can`t be absorbed by the national labour market. A very large percent of secondary education students continue their formal education just for the lack of better opportunities and don`t receive marketable skills within their Alma Mater.

Indicator: Mathematical and scientific performance PISA score

On the level of primary education, the Program for International Student Assessment (PISA) overseen by the OECD, which measures the mathematical and scientific literacy of 15-year-old students, generally demonstrates very positive scores for Slovenian students. The results clearly show that Slovenia is on a par with or superior to even more developed countries. The mathematical performance score illustrates performance superior to that of Austria and Germany, which in absolute terms allocate a far greater amount of public funds towards education. The mathematical performance score also shows a very low deviation between boys and girls, indicating gender equality unprecedented in all other countries observed within this analysis.

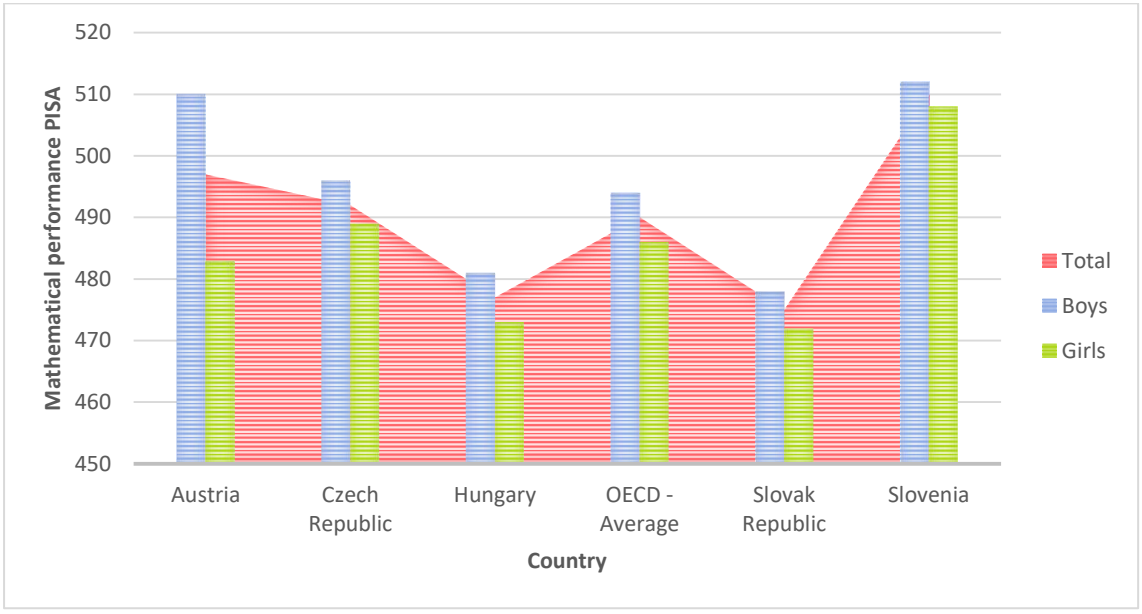


Figure 89: Mathematical performance PISA score in Slovenia compared to similar countries within the Danube region (Source: Organisation for Economic Co-operation and Development)

While the mathematical PISA score measures the mathematical literacy to formulate, employ and interpret mathematics in a variety of contexts to describe, predict and explain phenomena, recognising the role that mathematics plays in the world; the scientific PISA measures scientific literacy in the use of knowledge to identify questions, acquire new knowledge, explain scientific phenomena, and draw evidence-based conclusions about science-related issues. In this area as well, Slovenian students were scored very favourably, again surpassing the results of both Austria and Germany.

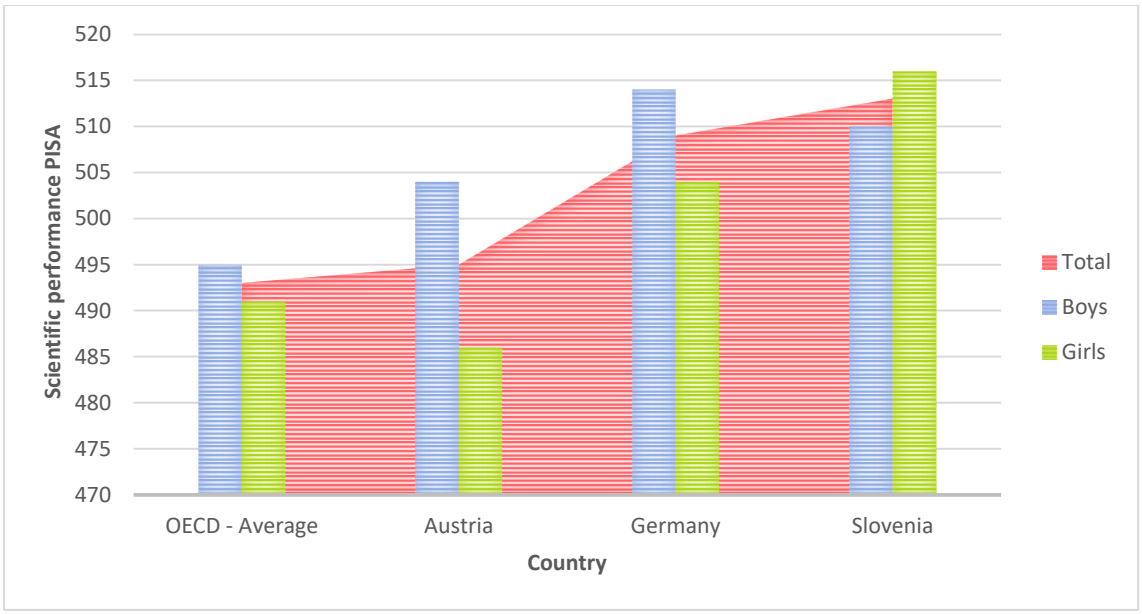


Figure 90: Scientific performance PISA score in Slovenia compared to similar countries within the Danube region (Source: Organisation for Economic Co-operation and Development)

7. CONCLUSION

Slovenia is one of the smallest and most diversified countries in Europe in terms of its landscape (including Alpine, Mediterranean and Pannonian), climate, biodiversity (flora and fauna) as well as the people that occupy it. It has a high share of private economy with a liberal market and it is highly integrated in European and international markets. It's by far the most advanced economy of the former Yugoslavian countries from which it gained its independence in 1991, as well as in comparison to all other countries with transition economies (except to the Czech Republic in some instances). The countries main natural resources are abundant fresh water reserves, large forest areas (58.4% of its landscape), clean environment and biodiversity as well as a long tradition of industrial production, a substantial body of knowledge, relatively good education and great capacity for sustainable tourism.

Awareness of the general public on the topics of sustainable development and environmental protection is at a very high level, which is partly a result of national campaigns carried out since the 1980s, even before Slovenia was able to obtain its independence. There is strong public and political support for the energy transition and circular economy concepts in general. However, few citizens understand the scope of investment that the transition itself would require, so increased prices of for e.g. invoices for energy (contributions for renewables) and utilities are very unpopular. The country is making substantial efforts to meet the energy saving targets, which are expressed as the maximum threshold for primary (7.125 Mtoe) and final energy (5.188 Mtoe) consumption. To this extent, Slovenia is supporting a wide array of measures, from energy renovation of the existing buildings stock to waste management and zero-emission mobility.

Several companies from Slovenia have in the past developed new, innovative products and solutions for their own manufacturing processes, which often represent good practices in green business also on the international level. Besides private companies, local public authorities and non-governmental institutions have taken an important role in promoting sustainable living and eco-innovative development. Several local decision makers have taken the transition towards sustainability very seriously and have taken the initiative to make the necessary steps, in a large extent by accessing EU structural and cohesion funds.

The national economic situation has improved drastically since the onset of the 2008 financial crisis, but even today, the aggregation of funds for research and development as well as product development and market penetration for "green" products/services is very difficult. One of the effects of governmental attempts to stabilize the national budget was also reduced funding for high-level scientific research, which is still being continued till this day.

The national banking sector has been saved from insolvency by sizable financial aid from the taxpayers, which was the foundation for much controversy in public debate. Despite this, the sector is still not sufficiently flexible in supporting eco-innovation by providing efficient and attractive financing instruments. For e.g., today it is relatively easy for natural persons to obtain a real-estate loan with very favourable conditions. In the case of companies, in particular SMEs and start-ups, it`s very likely that the creditor will not even begin the negotiation process as the risk factors considered are too high. In the age of quantitative easing and so called "helicopter money", the liquidity or lack there of from the side of the conventional banking sector for small enterprises is inconceivable. This negative impact is paired by an ever decreasing governmental expenditure on research and development, taking into account that also several private companies had to limit their expenditures for internal R&D because of the for restructuring brought about

by the new economic reality “post Lehman”. The major sources of funding where thereby sources from abroad, mostly EU structural funds.
Several micro, small and medium sized enterprises specializing in the areas associated to eco-innovation have also been very vocal in the past year about the evident disparity between the declaratory support of the government to the transition towards sustainability and on the other side a complete lack of systemic solutions, particularly dedicated financial mechanisms that would actually facilitate and bring about this transition in the real economy.

Notwithstanding some positive advancements, non-effective exchange of knowledge from higher education (which is deficiently adjusted to the actual requirements of the economy) to the private sector remains an imperative hindrance for eco-innovation. This can be observed with the inconsistency of an above-average number of workers employed within eco-oriented enterprises, which don`t actually create many marketable products and services with relevant eco-advancements.

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